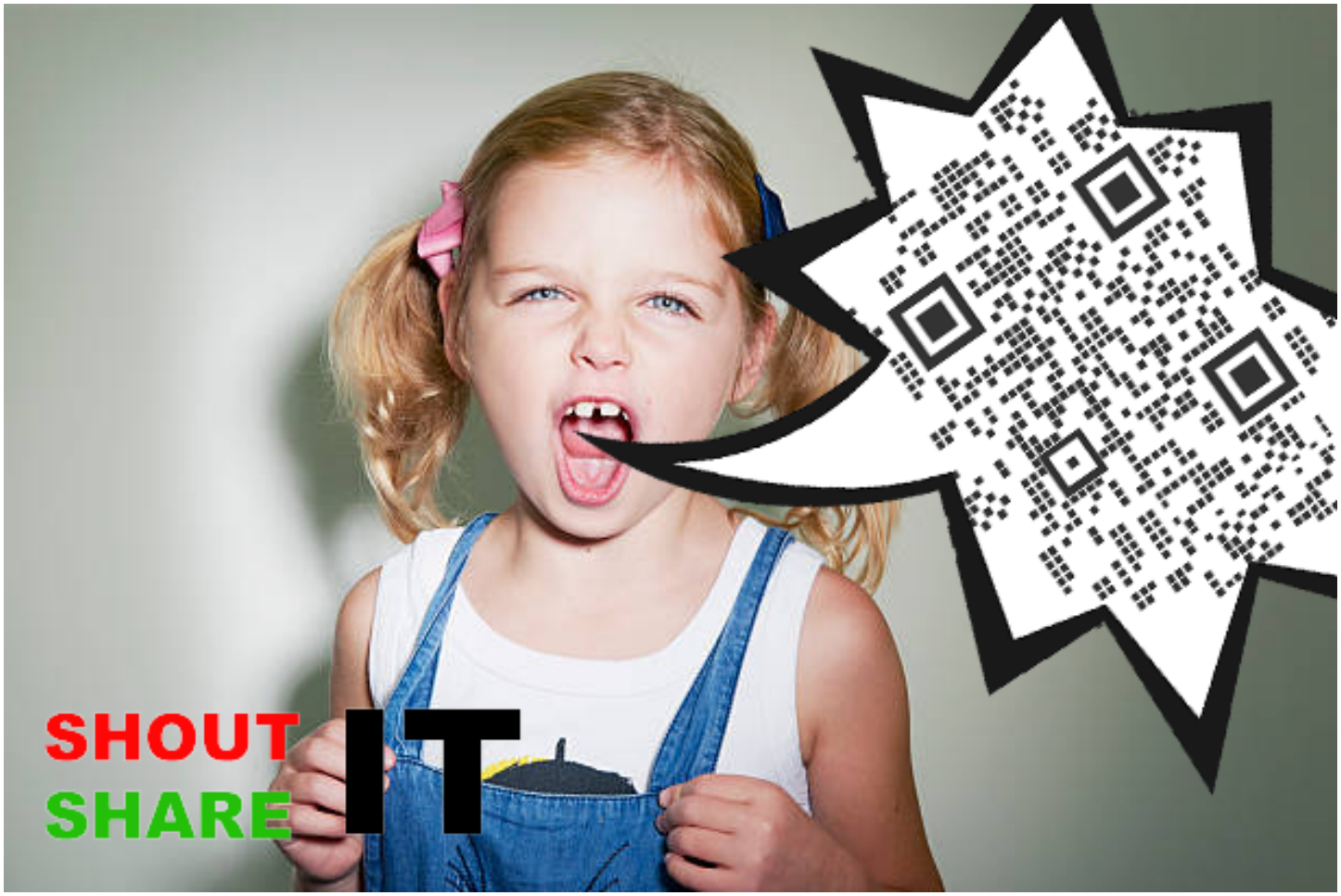
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(Note :- This Exploratory paper represents the views of the author and does not necessarily represent the views of the Centre or Editorial Board)

Exploratory Papers – 2

SCIENTIFIC KNOWLEDGE IN THE VEDAS

Padmakar Vishnu Vartak

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Editorial Note

The Dharam Hinduja International Centre of Indic Research was set up in Delhi by the Hinduja Foundation on 10th April 1993. The main objective of this Centre is to conduct and promote research in the Indian tradition of knowledge and to relate it to the contemporary situation. Soon after its inception, an effort was made to identify scholars in the country who would have the necessary background to participate in its programme of research. This was a difficult task, but more than 25 scholars have been identified, and we are fortunate that they are all collaborating with the Centre in its various programmes.

It is noteworthy that the setting up of the Centre of Research in the memory of the late Dharam Hinduja is an integral part of a larger programme of global co-operation, and two more centres have been set up in the USA and the UK. On 19th May 1994, Columbia Dharam Hinduja Indic Research Centre came to be set up in the Columbia University of New York city. Similarly, on 23rd June 1994, a Memorandum of Agreement was signed between Hinduja Foundation and University of Cambridge for the establishment of the Cambridge Dharam Hinduja Institute of Indic Research at the Cambridge University. The ultimate aim is to establish centres of Indic Research in all the leading universities of the different parts of the world, so that treasures of Indian tradition of knowledge could be explored vigorously and expeditiously by the joint labour of scholars of the East and the West. In due course, it is proposed to bring out an International Newsletter so as to keep everybody interested well informed of the progress of the research work initiated by the Hinduja Foundations of India, USA and UK.

Mr. S.P. Hinduja, Chairman of the Hinduja Foundation, has pointed out in his "Indic Research and Contemporary Crisis" that there is "a vast storehouse of theoretical and practical wisdom in the cultures and traditions of many countries and these traditions of knowledge need to be applied to contemporary times to help us solve present day problems... The Indian tradition of knowledge beginning with the Vedas and other texts is just such a storehouse of wisdom and contains a message of proven scientific knowledge, which is of relevance to all mankind regardless of race or creed." Our Centre in Delhi has, therefore, initiated the task of exploring the Indian treasure of knowledge, and during the course of this year, the Centre has received several learned papers from the scholars whose co-operation we have enlisted. It was felt that if some of these papers could be published and distributed among a wider circle of scholars and readers, a new impetus could be given to the exploration of the Indian tradition of knowledge. For this reason, our Centre has decided to bring out a series of exploratory papers. The second of this series is a paper written by Dr. P.V. Vartak, who is an eminent surgeon in Pune. Well equipped with the modern scientific knowledge. He has devoted himself deeply to the scientific study of the Vedas, Upanisads and Gītā. It is hoped that this paper will stimulate fresh thinking on the contents of the Veda and related literature. We shall be happy to receive comments and suggestions from scholars and other readers.

Kireet Joshi

PREFACE

The Veda in its real and original meaning is "knowledge". All the kowledge collected by the ancient Indian sages was compiled in the four books and that is why they are called the Vedas. These four Vedas, Rig Veda, Yajur Veda, Sāma Veda and Atharva Veda are very ancient. Their dates cannot be easily fixed. As the time flew by, exact meanings of the texts became unintelligible. Hence, Brāhmaṇas were written to explain the original Vedas. Still later, Āraṇyakas were written and then the Upaniṣads. All these with many other compositions are called the Vedic literature.

As we have seen above, Veda means knowledge. It is, therefore, reasonable to expect that the Vedic litrature must be full of knowledge. It is also quite likely that Science, being a part of knowledge, would be present in the Vedas. But, so far, very few people have attempted to reveal the scientific knowledge hidden in the Vedic literature.

In 1956, I passed my M.B.B.S examination and began my studies for the "Master of Surgery" degree. At that time, we were operating on a patient to give him a new nose because his nose was cut. For this plastic surgery, we used the skin of his abdomen. We had to operate on him many times to bring the skin-tube from his abdomen to his cheek and then only, we could repair his nose. At that time, I happend to read the Suśruta Saṃhitā - a text on Āyurvedic Surgery. There Suśruta had advised the use of a skin flap from the forehead so that only in one operation the nose could be repaired. This method is now used the world all our but it

originated in India, in ancient era of about 2000 years before Christ.

This experience led me to work on the hypothesis that a treasure of scientific knowledge is present in the ancient Indian books and I resolved to discover this science by studying the Vedic literature.

It is mentioned in the Rigveda, that the Queen Viśpalā got her lower limb severed in a battle, but at night Aśvins fitted an artificial iron limb to the Queen of Khela, who then fought the battle the very next day. (1-116-15). The ancient reference shows that artificial limbs were fitted then and the technique was better than the present one; because at present the patient whose limb is amputated needs at least six months to walk with the artificial limb. This is but one relevant example. But there are many other indications also. I feel that there is ample justification to undertake an impartial study of the Vedic literature with the purpose of exploring therein evidence of knowledge, even scientific knowledge. In the following pages, I have presented some of my explorations in a summary form with a view to stimulate among readers a fruitful exchange and a detailed study.

P.V. Vartak

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CHAPTER - I

THE VEDAS ARE BORN IN INDIA

Why do I speak of India while considering the Vedas ? Many scholars think that Rigveda was not born in India. But my work proves beyond doubt that Rigveda was born in India and India alone.

The reasons for my opinion are these :-

(1) Rigveda mentions rainy season as a separate season. Only in India the rainy season is a distinct phenomenon. There are three main seasons in India, namely the Summer, the Winter and the Rainy season. In all other countries the rains come either during summer or in Winter.

(2) Rigveda mentions tigers, lions, elephants, rhinoceroes, buffalos[1] and cows with a hump on their back.[2] All these animals are present together in only one country named India. If you go outside India towards the West you will find lions but no tigers. In the East you will find tigers but no lions. Cows are without hump outside India. Rhinos are seen only in India and Africa.

(3) The method of burning a dead body as mentioned in Rigveda is preudent only in India and nowhere else.

(4) The language of Rigveda, Sanskrit, belongs only to India.

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1. Buffalos in Rigveda 6-17-11, 8-77-10, 5-29-7, 8-12-8, 9--33-1, 9-69-3, 9-92-6, 9-95-4, 8-35-7, 10-106-2
2. Hump of a cow, *Kakud*, Atharva 9-7-5

(5) Vedas are highly esteemed and worshipped as religious books only in India, not outside.

(6) The proper pronunciation of many words in the Vedas is possible only by the Indian people. People from outside India find difficulty in pronouncing these words property.

(7) All the Vedic traditions are still present only in India, and nowhere outside India. The traditions of the country are maintained and preserved in Indian literature. This proves that Vedas were born only in India.

(8) All the Vedic deities are still esteemed in India but nowhere outside India.

(9) All the Vedic seers are held as the originators of the Gotras or lineage of groups of people only in India and not outside. Thus all the Indians have a link with the Vedic seers.

(10) The Vedic tradition of beginning the new year with Uttarā Phālgunī Nakṣatra and Vasanta Ṛtu (The Spring) and ending the previous year with Pūrvā Phālgunī as seen quoted in Taittirīya Brāhmaṇa (1-1-2), Taittirīya Saṁhitā 7-4-8[3] is found preserved by a particular sect of people in Mahārāṣtra, India, namely Chitpāvan Koṅkaṇastha Brahmin. This is found nowhere else in the world.

(11) The Vedic culture is found only in India and the Indian culture is based purely on the Vedas.

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3. Taittirīya Saṃhitā 7-4-8, T. Brāhmaṇa 1-1-2
वसंते ब्राह्मणोऽग्निमादधीत मुखं वा एतद् ऋतूनाम् ।। 6 ।।
यद् वसंतः ।। न पूर्वयोः फल्गुन्योरग्निमादधीत । एषा वा जघन्या रात्रिः संवत्सरस्य । यत् पूर्वे फल्गुनी एषा वै प्रथमा रात्रिःसंवत्सरस्य । यदुत्तरे फल्गुनी ।। मुखत एव संवत्सरस्याग्निमाधाय ।। 8 ।।
The same matter is present in Ś Br 6-2-2-18, Gopatha Br.. 6-19, Śāṅkhya. Br. Pañcaviṃśa Br. 5-5/9

(12) The three basic principles of the Hindu religion are :

(a) assumption of the one basic Supreme Energy substance behind the Universe named as Parameśvara or Parabrahma.

(b) Karma - theory, and

(c) the theory of rebirth.

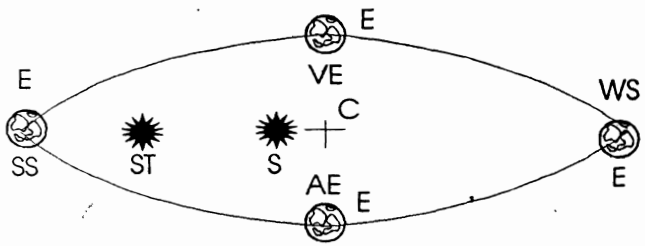
All these are found in the Rigveda. Thus Rigveda is the fountain head of the Hindu religion.

Thus Vedas belong to India and the Indian culture belongs to the Vedas. So the Vedas must have been born in India alone. All the theories propounding the composition of Vedas outside India are seem to be wrong. Even the world - renowned theory of "The Arctic Home in the Vedas" put forth by the late Shri Lokmanya B.G. Tilak appears to be wrong. Let us now examine that theory critically.

A CRITICAL STUDY OF 'THE ARCTIC HOME IN THE VEDAS'

"The Artic Home in the Vedas" was published in 1903 as a sequel to the late Mr. B.G. Tilak's previous book "Orion" or "Researches into the antiquity of the Vedas". In 'Orion' Tilak suggested that in the vedic hymns Vernal Equinox is shown in Mṛga or Orion and its period is 4500 years B.C. and that it receded to Kṛttikā in 2500 years B.C. in the days of Brāhmaṇas. Thus he carried the Vedic period back to 4500 years B.C., but asked if it was the Ultimate Thule of the Aryan antiquity. He held the same view as Prof. Bloomfield that the Vedic literature and language is not so primitive as to place it with the real beginnings of the Aryan life. These in all probabilities reach back several thousands of years more. Then Tilak was led to a different line of search and finally concluded that the ancestors of Vedic Ṛṣis lived in an Arctic Home in inter-glacial times. Let us see the mass of Vedic evidence he has put forth.

Earth's Orbit with Sun's Position



S - Sun's position as per modern Astronomy.
ST - Sun's position as per Tilak's assumption.
C - Centre of ellipse.
WS - Winter Solstice - 22 December
SS - Summer Solstice - 22 June
VE - Vernal Equinox - 21 March
AE - Autumnal Equinox - 23 Sept.

There were different estimates of the glacial period, ranging from two lacs of years to 10,000 years. Tilak selected 10,000 years and gave support of astronomy. Here he rightly said that the orbit of the earth around the sun is an ellipse, but he held that the Sun is not at the centre of the ellipse, but that it is in one of the focii. Moreover, he held the focus to be very far away from the centre. Actually this assumption is wrong. Modern Astronomy has shown that the eccentricity of the sun is of 0.01672 and so we should scarcely be able to distinguish the ellipse from a circle (Larousse Encyclopedia Of Astronomy). At perihelion, the earth is 147 million kilometres or 91.5 million miles away from the sun while at Aphelion the earth is 152 million kms. or 94.5 miles away from the sun. So the sun is only 15 lacs of miles away from the centre. As the basic assumption of Tilak was wrong, he made further mistake in holding that the difference between the legth of summer and winter is of maximum 33 days. Actually the difference is of only 7 days. Hence his opinion about post-glacial period as of 10,000 years is wrong. His further assumption that once upon a time there was spring at the Arctic region all the year round is also wrong.

Tilak has relied on Dr. Warren and assumed that the polar region was once inhabitable for human beings. Tilak gives the polar characteristics thus :-

(1) The sun rises in the South.

(2) The stars do not rise and set, but revolve or spin round and round in horizontal planes completing one round in 24 hours.

(3) The year consists of one long day and one long night of six months each.

(4) There is only one morning and one evening. The twilight of both lasts for about two months - 60 days of 24 hours each. The ruddy light moves round and round along the horizon like a potter's wheel completing one round in 24 hours.

CIRCUM - POLAR CHARACTERISTICS

(1) The sun will always be to the South of the Zenith of the observer (the same happens in a temperate zone).

(2) A large number of stars are circumpolar i.e. they are above the horizon during the entire period of their revolution & hence are always visible. The remaining stars rise and set as in the temperate zone but revolve in more oblique circles.

(3) The year is made up of three parts: -

(i) one long continuous night occurring at the winter solstice, and lasting for a period greater than 24 hours but less than 6 months.

(ii) Similar one long continuous day at summer solstice and then,

(iii) a succession of ordinary days & nights during rest of the year. A nychthemeron or a day and a night together never exceeds a period of 24 hours.

(iv) The dawn, at the closure of the long night, lasts for several days.

Tilak writes: "If a Vedic description or tradition discloses any of the characteristics mentioned above, we may safely infer that the tradition is polar or circumpolar in origin and the phenomena if not actually witnessed by the poet, was at least known

to him by tradition faithfully handed down from generation to generation."

The spinning round of heavenly dome over the head is a special characteristic of the north pole. We may find traces of it in the early traditions, if our ancestors ever lived near the north pole. Tilak felt that they lived near the North pole and found its evidence in some Vedic hymns. Thus, Rigveda 10-89-4 is translated by him thus; "Indra is said to separately uphold by his power heaven and earth as the wheels of a chariot are held by the axle". This translation does not show what Tilak meant. Rotation of the sky like a wheel of a chariot is seen even in India, it is not specific to the North Pole. Rig. 2-15-2 says: "The sky is supported without a pole". This is true everywhere, not only at the North Pole. In Rig 1-24-10, it is said that Ursa Major (Ṛkṣaḥ) are placed high and it follows, said Tilak, that it must be over the head of the observer. This meaning cannot be extracted from this verse. Moreover 'Ṛkṣaḥ' means stars and not only the Ursa Major or Seven Sages, Saptarṣayaḥ means the seven stars or Ursa Major. Only 'Ṛkṣaḥ' means any star.

In chapter 163 and 164 of Vana Parva of Mahābhārata it is said: "At Meru the Sun and the Moon go round from left to right (Pradakṣiṇam) every day and so do all the stars". Later on the writer informs us – "The mountain, by its lustre, so overcomes the darkness of night that the night can hardly be distinguished from the day". A few verses further we find: "The day and night are equal to a year to the residents of the place". These quotations are quite sufficient to convince anyone that at the time of the great epic, Indian writers had accurate knowledge of the North Pole and this cannot be

supposed to have been acquired by mere mathematical calculations. The reference to the lustre of the mountain is the description of the splendours of the Arora Borealis visible at the North Pole. I fully agree with Tilak that the author of Mahābhārata had the knowledge of the North Pole but I disagree with the conclusion that it might be an ancient tradition whose origin must be traced to a time when these phenomena were daily observed by the people. It is quite possible that some adventurers from India might have travelled to the North Pole and observed the facts there and on return reported all the facts to the sages here in India.

Tilak has taken support of Pārsī Scriptures. He has quoted thus - "Ahura Mazda warns Yima, the first king of men, of the approach of a dire winter, which is to destroy every living creature by covering the land with a thick sheet of ice, and advises Yima to build a Vāra or an enclosure to preserve the seeds of every kind of animals and plants. This meeting of Ahura Mazda and Yima took place in Airyana Vaejo, or the paradise of Iranians. The Vāra was accordingly prepared and Yima asked Ahura Mazda: "What lights are there?" Mazda answered, "There are uncreated lights and created lights. There the stars, the moon and the sun are only once (a year) seen to rise and set, and a year seems as a day." From this passage Tilak concluded that Airyana Vaejo or the original home of the Iranians was rendered uninhabitable by glaciation and in this original home the sun rose and set only once a year and the year was like a day. This conclusion is wrong because the Vāra must have been prepared away from the original home as is seen by the question

"What lights are there?" The questioner Yima was not acquainted with the place where Vāra was built, so he asked this question. Mazda also tells about the conditions there, i.e. at the distant place where Vāra was to be prepared. These conditions are those of the North Pole; so the original home was not on the north pole or nearby in the Arctic region.

Moreover, to say that the year is like a day there, one must know what a day is and what a year is ? To a man residing permanently at the Arctic home day and year are the same. There is no difference. Then why should a man of the Arctic region say that the year is like a day ? A person watching 12 hours' day must have said like that. So the original home was not in the Arctic region.

In his support Tilak cites Rigveda 7-76-2 and translates it: "The Devayāna path has become visible to me. The banner of the Dawn has appeared in the east." From this verse he infers that the Devayāna started at the rise of the Dawn. This inference appears correct apparently, but is not true, because Tilak himself has told that in the Polar and Arctic regions the sun rises in the south. Then how is it that the banner of the Dawn was seen in the east?

Tilak has taken support of Pitṛyāna also. He states that the Hindus consider Pitṛyāna as unauspicious for a man to die. This tradition is easily and rationally explained if the Pitṛyāna represented a period of continuous darkness. The funeral ceremonies of any one dying during the long night were deferred till the break of the dawn. Now the question arises that if there was a continuous spring at the Arctic region in the ancient era when Aryas lived there, as Tilak says, then is it possible to keep the dead body at home for six months? or at least

for more than three nights? Would it not decay at the temperâture of the spring ? If the temperature was near or below zero degrees celsius then the body would not putrify; but Tilak has said that in those days the temperature at the north pole was not so low.

Tilak gives the same tradition of Pārsīs. In Vendidad, Fargards a question is raised: how the worshipper of Mazda should act when death takes place during winter ? Mazda answers, "In such cases a Kata (ditch) be made in the house and there the lifeless body should be allowed to lie for two or three nights or for a month, until the birds begin to fly, the plants to grow, the flood to flow and the wind to dry up the water from off the earth." Apparently Tilak appears to be correct here, but the same question arises. How is it that the bodies did not decompose at the temperatures which were not zero degrees Celsius, during the ancient times as shown by Tilak ? Due to decomposition it would have been impossible to stay at home.

Moreover, there is a measurement like two or three nights or a month. Is it possible to count two or three nights or a month for a person residing at the Arctic region ? For him there is only one night. He canot say that it is a long night, because it is his usual night.

Now let us see what Tilak says about the Vedic Dawns. He says that the first hint regarding the long duration of the Vedic Dawn is in Aitėreya Brāhmaṇa 4-17. Before commencing the Gavamayana sacrifice there is a long recitation of not less than one thousand verses. The time for reciting this is dawn. The same time is referred to by Rigveda 7-67-2,3. This tradition suggests long

duration of dawn. In Taittirīya Saṃhitā (2-1-10-3) we are told that if the recitation ended before sunrise, other hymns should be recited (Āśvalāyana 6-5-8) Āpastamba directs that all the ten Maṇḍalas of Rigveda should be recited. If this is true then we have to accept that there was a prolonged dawn and therefore those Aryas were residents of the Arctic region; but then at the same time we have to admit that all the ten Maṇḍalas of Rigveda were composed or at least were in existence then. But Tilak himself does not admit this.

Tilak gives seven names of the Dawn and seven oblations to each. He takes it as seven parts of a long dawn of the Arctic region. He says that for seven oblations long time of the dawn is spent. But may I question how much time is taken for one oblation ? In a few minutes seven oblations can be made. Tilak himself has quoted Dr. Warren and has said that from 29th January to 16th of March there is dawn. So the dawn is 47 days long. Do we agree that for only seven oblations 47 days are required ? For an oblation 2 to 5 minutes are sufficient and so 7 oblations can be given in half an hour. Indian dawn is definitely that long.

Tilak quotes Rigveda 5-79-9, where the Dawn is asked not to delay, or tarry long, lest it might be scorched by the sun. Tilak infers from this that it was a long dawn. On the contrary, I say that this hymn suggests that if some time is spent, the sun will rise and scorch the dawn and therefore in turn it suggests early and quick sun-rise and not late, sluggish sunrise.

Rig. 1-118-11 applies an adjective Śaśvattama to the dawn. Tilak translates Śaśvattama as the most lasting. But it means perpetual. Any dawn is

perpetual or eternal because the dawn will be in existence till the Sun and the Earth exist. So it is Śaśvattama. Tilak gives many references to show long dawns but these do not prove that Āryas were residing at the Arctic home. They may have gone there from India and returned.

To prove long dawn Tilak mentions Taittirīya Saṃhitā 4-3-11. But the 11th verse of 4-3-11 itself mentions that there are five dawns and five seasons and five directions. Here the five seasons are clearly mentioned. Is it possible for the Arctic region to have five seasons ? It is impossible there. There may be at the most four seasons, namely (1) long night (2) long dawn (3) long day and (4) long dusk.

Let us now examine what Tilak says about the long nights. He quotes verses which show that Vṛtra, the enemy of Indra, was engulfed in long darkness. From this he concludes that it is a long night of the Arctic region. But if the enemy Vṛtra was there, Indra also must have been on the Arctic region. Then how is it that only Vṛtra got engulfed in the long darkness of a night while Indra did not ? So the meaning of this verse must be something else.

Tilak says that Vedic Āryas were residents of the Arctic region because the Vedic bards are seen frequently invoking their deities to release them from the darkness. These bards must be living on the Arctic region since their childhood. Then naturally, they were seeing the long nights since childhood. Those long nights were natural to them. So why should they invoke deities to release them from that darkness ? The bards who had gone from India to the Arctic region may pray like this, not the resident.

Tilak gives many quotations of the long darkness but they do not show that the bards were permanently residing at the Arctic region. They may have gone from India in search of knowledge, to the north pole.

LONG NIGHTS

Tilak has selected the following verses to prove the existence of a long night - a night of several days' duration.

Rig Veda 2-27-14 : "May not the long darkness come over us."

Rig. 1-46-6 : Here Aśvins are asked "to vouchsafe such strength as may carry him through the darkness."

Rig. 7-67-2 : "the ends of darkness have been seen and the banner of Dawn has appeared in the east."

Rig. 10-124-1 : "Agni has stayed too long in the long darkness."

Rig. 2-2-2 : Agni is said to shine during continuous nights.

In these verses long and continuous nights are described, so it shows that the poets knew the ordinary nights and they have compared the long nights with the ordinary 12 houred nights. So these verses do not prove the Arctic Home. The residents of the Arctic home cannot say that their nights are long, because the long nights are their natural nights and they were seeing those nights since their childhood.

Rigveda 10-127 is addressed to the Goddess of Night. In its Pariśiṣṭa, which is known as Rātri Sūkta

or Durgā Stava, the worshipper exclaims, "May we reach the other side in safety." This exclamation will not come from a man who is residing in the Arctic region since childhood, because he knows that the night extends over a long period. This will be certainly an exclamation from a person who is used to 12 houred nights when he sees such a long night of six month's duration.

Atharva Veda 19-47-2 says: "Each moving thing finds its rest in her (night), whose yonder boundary is not seen, nor that which keeps her separate. O spacious, darksome night, may we, uninjured, reach the end of thee, reach, O thou blessed one, thine end?" Tilak has quoted this verse to show the Arctic home. But I raise a question here. Can we say about the Polar night of six months duration, that its yonder boundary is not seen ? A new-comer in that region may say so, but a person born in that region can never say so, because since his childhood he is seeing the end of that night. Hence it seems that an Indian Sage or a traveller must have gone to the north pole and when he first saw that extended night he might have exclaimed like this.

Atharva Veda 19-50-3 : Here the worshippers ask: they may pass uninjured in their body through each succeeding night.

From all these verses Tilak concluded that it was the long Arctic night. He gives one more support of Taittirīya Saṃhitā 1-5-5-4 which is addressed to night, "O Citrāvasu, Let me safely reach thy end." A little further at 1-5-7-5, the Saṃhitā itself explains this Mantra thus :- "Citrāvasu means the night; in old times (purā) the Brahmins were afraid that it (night) would not dawn. "Tilak says: "here we have an express Vedic statement that in old times the

people had apprehensions regarding the time when the night would end. What does it signify ?" Tilak concludes that it was a long night of the Arctic region, and it was a story of former ages which Vedic bards knew by tradition. In turn Tilak shows that in old times the people were residing at the Arctic region. Again I take the same objection. The people residing at the Arctic region for generations can never be afraid of those nights and can never pray like that, because they had experience of the long nights since birth. People of the Arctic region will never be afraid that the night would not dawn. But if a person from India goes to the Arctic region and experiences a long night for the first time in his life, he will be afraid that the night would not dawn, and then he will pray to his deities to vouchsafe strength to carry him through that long night. Thus all the labour of Tilak does not prove the Arctic home for the Vedic Aryas, but shows that Vedic people must have gone from India to the Arctic region and the North Pole.

I appreciate Tilak's quotation of Rig. 10-138-3, which says: 'The sun unyoked his car in the midst of heaven." It appears from this verse that the sun stayed in the middle of the sky for a long time. This is possible only at the poles or the Arctic region. This proves that the Vedic sage had seen that region and had compared the sky there with that of India. It does not prove, as Tilak says, that the sage was there from his birth.

Tilak gives quotation of Rig.3-58-1 where the sun is called as the son of dakṣiṇa. Dakṣiṇa means the south. Sun rises in the south at the north pole or Arctic region, so this name is given, says Tilak, and shows that those bards were the inhabitants of

the Arctic region. May I question here, how the word 'Dakṣiṇa' stands for south ? I think the sages were calling 'Udīcī' to the east, because the sun rises there. While standing to give oblation to the rising sun their right hand pointed towards the south. The right hand means Dakṣiṇa. From this the name Dakṣiṇa is given to the south. The same position caused the west to be called as Paścima (back). After naming these three directions only one on the left hand side remained; so it is called as Uttara i.e. later, latter or remaining. Now I question, "Can this word 'Dakṣiṇa' be derived at the Arctic region where the sun rises in the south ? Thus this evidence goes to show that after the origin of the word 'Dakṣiṇa' for south, some people from India went to the Arctic region, there they saw that the sun rises in south 'Dakṣiṇa', and hence they called the sun 'Dakṣiṇa-Putra' i.e. son of south. People living permanently at the Arctic region cannot give this name, because it is usual for them to see the sunrise in the south, which they must be calling as the 'East'.

From the word 'Uttara' for North and the word 'Adhara' for south Tilak says: 'Ut-tara' means upper. North is upper only for an observer standing at or near the north pole. Hence this word is coined at the north pole, says Tilak. If we accept this view we have to accept that at the north pole there do not exist four directions or sides to a single plane like a sheet of paper, or to a plot of ground. There must be at least four directions to an area of the land in addition to above and below. Even at the north pole a person has four directions around him, one in front, second at his back, third on the left and fourth at his right. In addition, there are two more – one

above his head and, second below his feet. So Tilak fails to prove that Aryas were residents of the north pole or the Arctic region, on this base.

By the words 'Uttara' and 'Adhara', I may say that the words are coined and used later by the people who were conversant with the art of plotting and preparing a plan where the north is upper and the south is lower.

Tilak shows that Yuga represented a cycle of months during which the sun was above the horizon. Then he refers to 1-158-6 of Rigveda, where it is stated that Dīrghatamas became quite old in the tenth Yuga. Taking Dīrghatamas as the sun Tilak shows that the sun used to shine for ten months and then used to set down. But I object to this view, because how can 'Dīrghatamas' – continued prolonged darkness – be taken as the sun ? Dīrghatamas and sun are opposite to each other.

Tilak refers to Praśnopaniṣad 1-11[1], Atharva Veda 9-9-12, and Rig Veda 1-164-12 and translates thus : "The five footed father of twelve forms, they say, is full of watery vapours in the further half of the heaven. These others again say that he, the far-seeing, is placed on the six-spoked and seven-wheeled (car) in the nearer half of the heaven." Tilak says that the verse is straight forward, but questions as to why should there be two opinions about the nature of the year god ? Some say, it is five-footed i.e. having five seasons, while others say it is six-spoked or having six seasons. Why is this difference ? Aitareya Brāhmaṇa

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1. Praśnop. and RV 1-164-12
पंचपादं पितरं द्वादशाकृतिं दिव आहुः परे अर्धे पुरीषिणम् ।
अथेमे अन्य उ परे विचक्षणं सप्तचक्रे षडर आहुरर्पितमिति ।। 1.11।।

1-1 and Taittirīya Saṃhitā 1-6-2-3 take Hemanta and Śiśira together reducing the number of seasons from six to five. Śatapatha Brāhmaṇa 13-6-1-10 compounds Varṣā and Śarad together. Both are unbelievable according to Tilak. So he gives explanation, relying on the 13th and 14th hymns of Rigveda 1-164 as well as 9-63-9 that a real year of five seasons or ten months was intended. He further says that the arctic year of ten months is described here. My objection to this view is that the Arctic year may be of ten months, but there cannot be five seasons. There are only three seasons. So Tilak's view is not acceptable.

Here, I give a simple explanation. Theoretically there are six seasons but pratically it is difficult to differentiate between the Hemanta and the Śiśira because both are cold seasons. Similarly diffenrentiation between Varṣā and Śarad is also difficult because there are rains in Śarad Ṛtu too. Hence there is difference of opinion. From it we need not jump to the Arctic Home where such different seasons are never present.

For 'saptacakre' Tilak says it may be seven months or seven suns or seven rays of the sun. Tilak rightly says that this appears rather inconsistent. I dare to give here a consistent, rational explanation and translation, thus: "the father having five parts and twelve forms is full of water in the other half of the sky, say some experts. But others say that he is far-seeing in the remaining half. The six spiked one is oblated in the wheel of the seven."

The five parts are five seasons, taking Hemanta and Śiśira together. The twelve forms are twelve months. In his second half this father i.e. the year gives waters. This means second half of the year

gives rains. This is quite true in India, where there are rains during the southern course of the sun from 21st June to 21st December. The sky during this period is different from the sky in the northern course of the sun. When the sun resides in one half of the sky we cannot see that half, we are able to see the remaining half at night. So it is said "The other half". In the second half of the year the sky is cloudy, full of water, so we cannot see the distant stars in the sky. But in the remaining half during the period from 21 December to 21 June when the sun goes to the north, the sky is quite clear and therefore we are able to see far away in the sky. That is why it is called as 'Far-seeing' in ornamental language.

The six-spiked thing is nothing else, but the year having six seasons. It is oblated in the cycle of seven. This means, the year consists of a cycle of seven days of a week. The system of seven week-days was invented by the Indian sages at the time of Taittirīya Saṃhitā in about 8357 B.C. The source of this is the Yajña system. The Brahmins used to be 'Dīkṣita' for six days and then they were taking holiday on the seventh day. During this holiday they used to give offerings only to the Sun, which was supposed to be the Ātman. So this day got the name of Āditya–Sunday. On the other six days of the consecration, they used to give oblations to the planets, one on each day, taking alternately from the sun and from the earth. After Sunday they gave oblation to the Moon and called that day as Monday, the Soma's day. The moon was given the second place because the Moon represents the mind. After the Moon, they selected a planet nearer to the earth, namely the Mars. They oblated the Mars on

the third day and hence called it by the name of the Mars. Next day they oblated to the planet nearer to the sun i.e. Mercury and labelled it as Budha's day. Next they selected the planet nearer to the earth i.e. Jupiter and called it the Bṛhaspati day. Next a planet near the sun was selected, namely Venus, and called it as Śukra or Bhārgava day. Lastly a planet near the earth i.e. Saturn was selected to give the offerings and named the day as Śanaiścara day. This shows that they selected the planets alternately from the internal group and the external group of planets. The internal group is from the Sun to the Earth, the external group includes the planets from the space beyond the orbit of the earth. These week-days are mentioned in Atharva Jyotiṣa Śloka 93, Yājñavalkya Smṛti Ācārādhyaya Śloka 295, Mahābhārata Ādi Parva 160/7 and Kātyāyana Gṛhya Sūtras, third Kāṇḍa, fifth Kaṇḍikā, second verse. A special name 'Vāra' is coined by Mahābhārata and Kātyāyana for the week days. Vālmīki Rāmāyaṇa also mentions Thursday as Bṛhaspati day (Ayodhyā 26/9). I have fixed the date of expulsion of Rama to the forest as 29th November 7306 BC and this was really Thursday, as proved by mathematical calculations.

Tilak is wrong in translating that "the far seeing is placed on a six-spoked (Ṣaḍare) and seven-wheeled car." There is no word for 'car' in the text. The exact word is 'Ṣaḍara' and not 'Ṣaḍare'. Ṣaḍara is Prathamā while Ṣaḍare is Saptamī. Tilak should not have done this perversion of transferring a Kartā to an adjective. "Saptacakre Ṣaḷara Āhurarpitam" is a seperate sentence, not connected with 'Vicakṣaṇam'. Here a speciality of 'Ṣaḍara' told is that it is oblated in the wheel of seven. I request the readers to note this wrong translation of Shri

Tilak. I further request them to read my version with an unbiased mind and I hope that every one will accept my meaning.

Here it is important to note one more fact that the days depend on the Sun and the six seasons (Six spokes) also depend on the Sun. Both the days and the seasons have no relation with the Moon. Therefore they are connected together and it is stated that the six-spiked year is oblated in the cycle of seven days.

In a chapter named 'The Cow's Walk' no strong evidence is given by Tilak, so I need not criticise it.

Thus considering all the important evidences of Tilak, we come to the conclusion that he has totally failed to prove that the ancient home of the Āryas was the Arctic region. I do not deny the importance of his great work but I have to say that his conclusion is wrong. It is our duty to examine his work and come to a correct conclusion. My conclusion is that Vedic Āryas were original residents of India, but they travelled all over the world, up to the North Pole and they recorded in Vedas the facts they experienced there at the North Pole and the Arctic region.

CHAPTER - III

SCIENCES IN VEDAS

Let us now see how far science was advanced during vedic times. Many branches of science were being developed during Rigveda period. Numbers in the decimal system were developed in the Rigveda, because it mentions the numbers 10, 20, 30, 40, 50, 60, 70, 80, 90, and 100 at 2-18. One thousand is mentioned at 6-48-15, while one lac is mentioned at 8-38-13. Yajurveda 17/2 mentions number up to Parārdha i.e. 10^{18}

Stitching is mentioned at 2-32, while weaving is described at 4-9. Silk is mentioned at 10-85-20, blasting of mountain is described at 1-116-20. Agriculture is well described at 4-57. A palace having one thousand pillars is mentioned at 5-62-6 which shows advance in the civil engineering science.

SCRIPT WAS USED

Many people opine that there was no script and no knowledge of writing in Vedic era, but this opinion is absolutely wrong. Rigveda 10-71-4 states: "Illiterate man cannot see the language even though it is visible, and cannot understand it even though he can hear it. But she (that language) exposes her body to the literate person just like the lady exposes her body to her husband".[1] What does Vāk (language) mean which is visible ? Vāk may be taken as speaking but uttered words are not visible. Rigveda says that Vāk is visible even though it cannot be seen. This definitely means that the Vāk was being written. Written words are visible but cannot be or may not be readable. Just looking is not sufficient, we must read it for which literacy is essential. Thus this is a clear reference to a script, to some written words which are visible but illiterates were unable to see them, i.e. to read them. Only a literate person could see them.

Rig 1-164-39 states that the words or letters of the verses of Rigveda are the homes of the Gods in the sky. If one does not understand those letters what will Ṛcā do ? But those who understand, live happily.[2] Here we have to concentrate on the word 'Akṣara' which means the thing which is not

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1. Rigveda 10-71-4
   उत त्वः पश्यन् न ददर्श वाचं उत त्वः शृण्वन् न शृणोति एनाम् ।
2. Rigveda 1-164-39
   ऋचो अक्षरे परमे व्योमन्यस्मिन्देवा अधि विश्वे निषेदुः ।
   यस्तन्न वेद किमृचा करिष्यति य इत्तद्विदुस्त इमे समासने ।। 39

perishable. A written word is really imperishable as compared to the spoken word which immediately vanishes. The imperishable words of the Rigveda must be the written words. These might have been written on rock or palm leaves or skin of trees so that they would become eternal, imperishable.

ASTRONOMY AND THE TIME-RECKONING SCIENCE

Astronomy or the science of stars was much advanced in Rigveda era and the sages had based their time-reckoning science on astronomy. It is usually said that the Arabs developed astronomy because they had to depend on the stars while travelling in the deserts. This is only a conjecture. Why should not one make another conjecture that it was India who developed the science of astronomy because she was doing agriculture for which rains were essential and to forecast about the arrival of rains the Indians developed astronomy ? For this conjecture I have many evidences which are presented here.

Rigveda 6-32-5 states that rains come in the Dakṣiṇāyana[1] or the southward journey of the Sun. Devayāna or the northward journey of the sun is mentioned at 10-18-1, while the southward journey of the sun or Pitṛyāna is mentioned at 10-88-15.

Rigveda 4-57-5 requests the deity Śunāsīrau to shower the waters prepared in the heavens.[2]

This statement clearly indicates that the rains were connected with Śunāsīrau (or Canis major and Canis minor) which is nothing else than Mṛga Nakṣatra.

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1. Rigveda 6-32-5
   ससर्गेण शवसा तक्तो अत्यैरप इन्द्रो दक्षिणतस्तुराषाट् ।। 5 ।।
2. RV 4-57-5
   शुनासीराविभां वाचं जुषेथां यद्दिवि चक्रथुः पयः ।
   तेनेमामुप सिञ्चतम् ।। 5 ।।

The above two statements together prove that the sages knew that the rains begin with the summer solstice in India and, at the time of the summer solstice, the sun resided in Canis major and Canis minor i.e. the Mṛgaśiras Nakṣatra, in their life. Thus it is clear that the sages had linked astronomy with the Meteorology or the science of climate.

One may question here as to why we should hold that the sun was near Canis ?

To assume this we have one evidence at Rig. 1-101-13 which states: "Who awakened Ṛbhus ? The Sun answered that the Dog awakened, because today is the end of the year"[1]. Here the Dog means the Mṛga Nakṣatra. Ṛbhus means the clouds. The clouds were awakened by it, that means the clouds started showering the rains. The Sun was at Mṛga when the rains began in that ancient era.

Thus it is clearly seen that oncoming of the rainy season was linked with the summer solstice and the Sun's place in Nakṣatras at that time. With the help of the modern knowledge of astronomy that the Equinoxes precede backwards at the rate of 50.2 seconds per year, or in other words the Nakṣatra of the Sun on the equinoctial day recedes back at the rate of 960 years per Nakṣatra, we can calculate the period of the fact mentioned in the Rigveda. At present the sun resides in the Mṛga Nakṣatra at the time of the beginning of the rainy season. The same fact is described by the Rigveda, but it is not composed during this modern age. We know that the Rigveda resided on the tongues of the Brahmins

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1. RV 1-161-13
   सुषुप्वांस ऋभवस्तदपृच्छतागोह्य क इदं नो अबूबुधत् ।
   श्वानं वस्तो बोधयितारमब्रवीत्संवत्सर इदमद्या व्यख्यत ।। 13

for thousands of years. How many thousand years is the question which is solved astronomically. The rainy season started with the sun in the Mṛga then and also at present. Hence a cycle of 27 Nakṣatras must have been completed. The sun to recede back 27 Nakshatras at the rate of 960 years per Nakṣatra takes 25920 years. Thus it is evident that the Rigveda is composed 25920 years ago. Or substracting 2000 years of this Christian era we can tell the date of Rigveda as 23920 B.C.

27 Nakṣatras are mentioned here but did the Vedic sages know these 27 Nakṣatras ? The answer is definitely 'yes'. Veda tells the name of all the 27 or 28 Nakṣatras. The Indians were doing agriculture and were happily steady in life. Since evening they had no work left and therefore they took to stargazing. The first thing in the sky which attracts the minds is the Moon. The sages also had their minds attracted towards the Moon. So they linked the moon with the mind. The link of the moon and the mind is seen in almost whole Sanskrit literature. By the daily observation they noticed the movements of the moon. They noticed that the moon changes its place among the stars every day. They found out the path of the Moon – the star path. They observed that the stars did not move at all. Hence they named the stars as Nakṣatras. The word 'Nakṣatra' is the definition itself. As given in the Mahābhārata, the thing which does not move is Nakṣatra. They selected all the stars and constellations at a certain interval on the star path of the moon and named them because they observed that the moon came near a particular star in one day. They based their unit of time naming the day after the Nakṣatra, where the moon resided. The

tradition is continued till today in India. We say that today is Citrā Nakṣatra, tomorrow Swātī, a day after tomorrow Viśākhā, and so on. Thus they could count the days.

Five Planets Were Discovered :

While observing the movement of the Moon among the fixed stars, they found out five planets which are mentioned in the Rigveda (1-105-10, 10-55-3, 5-41-14, 4-50-4, 10-123). Thus distinction between the moving planets and the non-moving stars was done. This was a marvellous feat. It requires a keen observation for years together. The modern man also cannot find out the planets easily. Vedas named the five planets scientifically. Guru or Bṛhaspati means big and this name is given to the planet Jupiter which is really the biggest among the planets. Actually to a normal eye the Jupiter apears smaller than the Venus, then how could the Vedic sages know that the Jupiter was the biggest ? The very name suggests that Vedic people had scientific knowledge. Śani means slow moving and in fact the Saturn is the slowest among the then known five planets. Śukra means brightness and the Venus is really the brightest among the planets and stars.

Lunar Month :

While observing the moon everyday they noticed that the moon increases in size for a few days and then decreases in size for a few days, and then it vanishes totally. Again it appears the next day. On this observation of waxing and waning of the moon they fixed a period of time from one full moon to the next full moon (or no moon day to the

next no moon day) and it is called as Māsa. This word Māsa itself means the Moon, hence the name is scientific. One can see the full circular moon easily. They named the day on which full moon is seen as Pūrṇimā. A mās means Moon, Pūrṇimā means full moon, -i- is just a connecting vowel. Pūrṇimā means Pūrṇa mās. They observed that in 15 or 16 days the moon becomes full. According to the increase in the size of the moon they named the Tithi. For example, when the moon was first seen as an arc, they called it Pratipadā. When the size was of two arcs they called it Dvitīyā, three arcs tṛtīyā and so on upto 14 arcs named as Caturdaśī. Then it was Pūrṇimā or full moon day. They assumed 16 Kalās or arcs of the full moon. Half moon means 8 kalās, so it was called as Aṣṭamī. Quarter of the moon had 4 kalās so it was named as Caturthī: Thus by visible size of the moon they arranged tithis and counted the days accordingly. After full moon the moon recedes in shape by one Kalā every day and in 15 days it disappears. Vedic sages noticed it and found the reason behind the vanishing of the moon. The reason is that the moon goes very near the sun on that day and due to the brilliance of the sun, the moon becomes invisible. This science behind the disappearance of the moon is put only in one word "Amāvāsyā". The word is composed of two parts Amā+vāsyā. Amā means together.' Vāsyā means residence. Because on that day the Sun and the Moon reside together, it was named as Amāvāsyā. It is quite interesting to note here that in this age of science all the scientists call this day as New Moon day. It is quite well known now that 'new' moon never comes in the sky. Even then this unscientific term is used in the modern

science. On the other hand the ancient Vedic name appears to be very scientific.

During the fifteen days of the increasing moon, the moon light increases, day by day, till Pūrṇimā and hence these 15 days were called as Śuddha or Śukla Pakṣa. Pakṣa means a wing of a bird. A bird flies with its two wings. Similarly the time flies with the two wings, the Śukla Pakṣa and the Kṛṣṇa Pakṣa. The second half is called as Kṛṣṇa or dark because the moon light goes on diminishing and the size of the moon diminishes one Kalā per day, adding to the darkness of the night from Pratipadā to Caturdaśī and then Amāvāsyā. Thus a Māsa or a month was divided in two Pakṣas.

The Tithi and the day were different. The day was dependent on the Sun. 'Udayād Udayaṃ Vāraḥ this means: one Vāra is the period from one sun-rise to the next sun-rise. Ahan was the period from sun-rise to sun-set while Rātri was the period from the sunset to the sun-rise.

They observed that the place of the full moon changed. If one full moon was at one star, the next full moon was at another star. Hence according to the Nakṣatra where the full moon appeared they named their Māsas. Thus if the full moon was near Citrā Nakṣatra they named that month as Caitra Māsa (Taittirīya Saṃhitā 7-4-8). Thus the names of the Māṣas were given as follows – Caitra from Citrā Nakṣatra, Vaiśākha from Viśākhā, Jyeṣṭha from Jyeṣṭhā, Āṣāḍha, Śrāvaṇa, Bhādrapada, Āśvina, Kārttika, Mārgaśīrṣa, Pauṣa, Māgha, Phālguna. These twelve months composed their Cāndra Varṣa. The development of lunar months and their names from Nakṣatra of full moon is seen from Taittirīya Saṃhitā 7-4-8, T.Br. 1-1-2-8, Śatapatha.

6-2-2-18,+11-1-1-7, Gopatha Brāhmaṇa 6-19, Kauṣītakī Br. 19-2-3.

Seasons and Sun :

During this development they observed that a specific type of weather appeared at a specific interval and there was a cycle in this change of the climate. They observed that the Moon was not responsible for this climatic variations. They further observed that the climate depended on the position of the rising sun (Rig 1-95-3)[1]. They considered the Sun as the Ātman and therefore they offered water with two hands together to the rising sun just after bathing in the river every day. The psychology of the human being is that once a person goes to one place today he will again select the same place next day. That is why we sleep at one particular place every night. If we change the place we cannot get sound sleep. While travelling, once you go to a hotel and get satisfaction, next time when you go to the same city you will try to get the same hotel and its same room and you will select the same bed again. With this psychology the sages used to go to the same spot of the river for bath and for giving oblations to the Sun. While offering to the Sun every day from the same spot they noticed that the Sun never rises at the same spot. Some days it moves to the right while on other days it moves to the left. Further they observed that when the rising sun went to the extreme right it was cold while when the rising sun went to the extreme left it was hot. They

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1. RV 1-95-3
त्रीणि जाना परिभूषन्त्यस्य समुद्र एकं दिव्येकमप्सु ।
पूर्वामनु प्र दिशं पार्थिवानामृतून् प्रशासद्वि दधावनुष्टु ।। 3 ।।

further observed that when the sun turned from the extreme left and started going to the right there apeared rains. When the rising sun was in the middle the climate was pleasant. On this observation they based their Ṛtus, the seasons. The names of the seasons are Vasanta, Grīṣma, Varṣā, Śarad, Hemanta and Śiśira.

Depending upon the course of the rising sun they composed the groups of these Ṛtus. When the sun went from extreme left i.e. North towards the right or South they called that period as Pitṛyāna (Rig 10-88/15) or Dakṣiṇāyana. Northward journey of the rising sun was named as Devayāna (Rig 10-18-1) or Uttarāyaṇa. These two Ayanas composed their year. Varṣā, Śarad and Hemanta composed the Dakṣināyana while Śiśira, Vasanta and Grīsma composed the Uttarāyaṇa. (Yajus Pāṭha 5,[1] Suśruta Saṃhitā 6-7, Rig 6.32.5.[2] Vālmīki Rāmāyaṇa Ayodhyā 63-15[3]).

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1. Yajuh Pātha 5-7
   स्वराक्रमेते सोमार्कौ यदा साकं सवासवौ ।
   स्यात्तदादि युगं माघस्तपः शुक्लो अयनं हि उदक् ।। 5 ।।
   प्रपद्येते श्रविष्ठादौ सूर्याचंद्रमसौ उदक् ।
   सार्पार्द्धे दक्षिणार्कस्तु माघश्रावणयोः सदा ।। 6 ।।
   धर्मवृद्धिरपां प्रस्थः क्षपाह्रास उदग्गतौ ।
   दक्षिणेतौ विपर्यस्तौ षण्मुहूर्त्ययनेन ।। 7 ।।

2. Suśruta 6-6
   कालविभाग करत्वाद् अयने द्वे भवतः ।
   दक्षिणं उत्तरं च ।
   तयो दक्षिणं वर्षा शरद् हेमन्ताः ।
   उत्तरं च शिशिर वसन्त ग्रीष्माः ।

3. V. Rāmāyana Ayodhya 63-14-15
   ततः प्रावृडनुप्राप्ता मम कामविवर्धिनी ।। 14
   उपास्य हि रसान् भौमांस्तप्त्वा च जगदंशुभिः ।
   परैतीचरितां भीमां रविराविशते दिशम् ।। 15

Year began with Rains :

They observed that every time the rising sun turned from the north towards the south, there were showers of rains (Rig 6-32-5). The rains could be experienced by all the people. They noticed that at a particular interval the rains began. This interval between the beginning of one Varṣā to the next Varṣā Ṛtu was named as Varṣa. Varṣā means the showers. Thus their year was formed and named as Varṣa. India was agricultural land and therefore the rainy season was important and was given the first place in the year.

Rigveda people began their new year with the rainy season. This statement is based on the following evidence. RV 2-24-5 states: "The ancient verses of Brahmaṇaspati open the door of future waters after months or years. Therefore without, any effort the heaven and the earth enjoy each others waters."[1]

Here it is important to note that the cycle of water was known to the Rigveda people. In support of this there is one more Ṛcā in Rigveda 1-64-51 which states: "this water is common ; it goes up and comes down. The rains satisfy the Earth while the Agni satisfies the sky".[2] This verse shows clearly that the sage knew that the water is common

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1. RV 2-24-5 of Pandit Chitrava Shastri's Translation in Marathi
   ब्रह्मणस्पति जी स्तोत्रे करतां ती काही पुरातन स्तोत्रे भावी उदकांची द्वारे तुमच्याकरता महिन्यांनी किंवा वर्षांनी मोकळी करतात. नंतर प्रयत्न न करता द्यावा पृथ्वी परस्परांचे उदक उपभोगतात.

2. RV 1-164-51
   समानमेतदुदकमुच्चैत्यव चाहभिः ।
   भूमिं पर्जन्या जिन्वन्ति दिवं जिन्वन्त्यग्नयः ।।

between the Earth and the Heavens. The rains satisfy the Earth by showering water from the Heavens. On the other hand the Agni, that means Heat, satisfies the heaven by supplying it water from the Earth.

Rig. 7-103-1 states: "Like a Brāhmin following a Vrata or a religious act, the frogs, which were asleep for a year, began croacking which fascinated the Rains."[1] Here it is shown that just like a Brahmin who recited the Vārsika Mantras at the beginning of the new year, the frogs also woke up from their year-long sleep and started talking at the beginning of the new year. It is to be noted that at the beginning of the rainy season the frogs start croacking. Thus it shows that the year began with the rainy season.

Rig. 7-103-7 states: "When the rainy season arrives, on that day of the year (which appears to mean on the first day of the new year) frogs generate everywhere".[2]

Rig. 7-103-8 states: "Frogs are croaking like a Brāhmin who sings yearly Psalms, frogs soaked with sweat come out in the open ground as soon as the rains began." The yearly Psalms were sung at the beginning of the year and at that time the Brahmins used to sweat. All these facts together show that at the end of the summer and beginning of the rainy season or, in the words of the modern language, on

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1. RV 7-103-1
   संवत्सरं शशयाना ब्राह्मणा व्रतचारिणः ।
   वाचं पर्जन्यजिन्वितां प्र मण्डूका अवादिषुः ।।
2. RV 7-103-7
   ब्राह्मणासो अतिरात्रे न सोमे सरो न पूर्णमभितो वदतः ।
   संवत्सरस्य तदहः परि ष्ठ यन्मण्डूकाः प्रावृषीणं बभूव ।।

22nd of June at the summer solstice, their new year used to begin.[1]

Rig. 7-103-9 states: "All these frogs obey the orders of the gods and follow the rules of the seasons for twelve months. At the end of the year, harassed by the heat, the frogs, at the beginning of the Varṣā Ṛtu, come out of their nests." This Ṛc clearly shows that at the end of the year there was extreme heat and with the beginning of the rains they used to celebrate their new year.[2]

Rig. 7-101 and 102 praise the rainy season. There are no verses praising the summer or winter. Hence it shows that the rainy season was important and naturally their year began with the rainy season.

All the above Ṛcs are composed by sage Vasiṣṭha whose hundred sons were killed according to Rig 7-104[3]. The incident of the massacre of the hundred sons had taken place during the king Kalmāṣapāda according to Mahābhārata Ādi Parva 176. Kalmāṣapāda was fifteen generations earlier than Rāma. Hence this tradition of beginning the new year at the beginning of Varṣā Ṛtu continued till Rāma and Rāmāyaṇa of Vālmīki.

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1. RV 7-103-8
   ब्राह्मणासः सोमिनो वाचमक्रत ब्रह्म कृण्वन्तः परिवत्सरीणम् ।
   अध्वर्यवो धर्मिणः सिष्विदाना आविर्भवंति गुह्या न केचित् ।।

2. RV 7-103-9
   देवहितिं जुगुपुर्द्वादशस्य ऋतुं नरो न प्र मिनंत्येते ।
   संवत्सरे प्रावृष्यागतायां तमा घर्मा अश्नुवते विसर्गम् ।।

3. Bṛh Dev 6-837-844
   Soudāsa means the son of Sudāsa who was named as Kalmaṣapāda. He was the husband of Madayantī.
   संवत्सरं तु मण्डूकान् ऐंद्रसोमं परं तु यत् ।
   ऋषिर्ददर्श रक्षोघ्नं पुत्रशोकपरिवृतः ।
   हते पुत्रशते क्रुद्धः सौदासैर्दुःखितस्तदा ।।

Vālmīki in his Rāmāyaṇa has not clearly stated when their new year started, but he has given such evidence indirectly. At Ayodhyā. 77/25, Vālmīki states that the new year flags used to get defaced due to rains and heat.[1] Heat and rain together appear in June at the summer solstice. Thus at the summer solstice their New year began.

Taittirīya Brāhmaṇ 3-10-4-1 states: "The head of the year is Vasanta while the tail is the Varṣā."[2] This shows that the year ended with the Varṣā. So it must begin with Varṣā. Taittirīya Saṃhitā 6-5-3 states: "The vessel of Ṛtus has two mouths, who knows the mouth of Ṛtu's ?"[3] The verse shows that nobody was certain where is the mouth of the season's cycle. This is because, I think the original new year began with the Varṣā Ṛtu, on 22nd June, on the Summer Solstice but then a new tradition came up to begin the new year with the Vasanta Ṛtu or Spring.

Rig. 1-161-13 states: "Who awakened Ṛbhus ? The Sun replied: the Dog aroused because today is the end of the year." Ṛbhu means clouds according

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1. V. Rāmāyana 77-25
   वर्षातपपरिक्लिन्नौ पृथगिन्द्रध्वजाविव ।
2. TB 3-10-4-1
   तस्य ते वसंतः शिरः ।
   ग्रीष्मो दक्षिणः पक्षः वर्षाः पुच्छम् ।
3. TS 6-5-3
   उभयतो मुखं ऋतुपात्रं भवति ।
   को हि तद्वेद यदृतूनां मुखम् ।

to Rig. 1-161-11 and 12; 4-33-7[1] Dog means Canis or Mṛga Nakṣatra. Mṛga Nakṣatra awakened the clouds so that the rainy season began. This was the end of the year. Thus it is clear that the Rigvedic new year started with the Rainy season on the summer solstice or at the beginning of the Dakṣiṇāyana with the Sun in Mṛga Nakṣatra. The date of this fact is 23920 BC.

Taittirīya saṃhitā 7-4-8 shows that Uttarā Phalgunī was the first night of the new year, Pūrvā Phālgunī was the last night of the previous year and Vasanta Ṛtu was the mouth of the year. Taittirīya Brāhmaṇa 1-1-2 states the same fact. Taittirīya is a branch of Yajurveda. So it appears that the Yajurvedic tradition was to begin the new year from the Spring or Vastanta. Other evidences to support the fact are Śatapatha. 6-2-2-18, Gopatha Brāhmaṇa 6-19, Pañcaviṃśa Brāhmaṇa 5-9-9 and Śaṅkhyāyana Brāhmaṇa. We cannot say if this custom was later or earlier. On the contrary it appears to be a concurrent custom. Let us see how.

If the Vasanta Ṛtu began with Phālgunī Pūrṇimā the Sun must be diagonally opposite in Uttarā Bhādrapadā at the Vernal Equinox on 21st March. At present this is the condition, but Vedas have not been composed in the present era. When weree the Vedas composed then ? Of course one cycle of 27

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1. RV 1-161-11 and 12
उद्वत्स्वस्मा अकृणोतना तृणं निवत्स्वयः स्वपस्ययां नरः ।
अगोह्यस्य यदसस्तना गृहे तदद्येदमृभवो नानु गच्छय ।।
संमील्य यद्भुवना पर्यसर्पत क्व स्वित्तात्या पितरा व आसतुः ।
अशपत यः करस्नं व आददे यः प्राब्रवीत्प्रो तस्मा अब्रवीतन ।।
RV 4-33-7
द्वादश द्यून्यगोह्यस्यातिथ्ये रणन्नृभवः ससन्तः ।
सुक्षेत्राकृण्वन्ननयन्त सिन्धून्धन्वातिष्ठन्नोषधीर्निम्नमापः ।।

Nakṣatras must have ellapsed since the Vedas. The precession of Equinoxes has a rate of 960 years per Nakṣatra. Thus 960 x 27 = 25920 years ago, the Vedas must have been composed. Same is the period we have seen earlier calculating on the verse showing the beginning of rainy season at Mṛga Nakṣatra.

Thus it seems that both the methods were being practised simultaneously and that is why Taittirīya. 6-5-3 questions who knows where is the mouth of the Ṛtu cycle ?

Adhimāsas :

Gradually the Vedic sages noticed that the seasons slided back on the Lunar months. Hence they developed an ingenious system of taking two intercalary Māsas after the fifth year. Why two months ? Because each Ṛtu was composed of two months. To adjust the Lunar months with the Ṛtu they had to take these two intercalary months as Adhimāsa. This system is described by Mahābhārata Virāṭa parva 52/3.[1] From the study of seasons and the Lunar months they noticed that the Lunar year, that is, a period from one Caitrī full Moon to the next Caitrī full moon, did not correlate with the seasonal year, that is, a period from one summer solstice to the next. The seasonal or Ārtava year consists of 365.241666 days, while the Lunar year consists of 354.367 days. The difference is 10.88 days each year. Therefore after five years the difference comes to 54.40 days or approximately two Māsas, or one Ṛtu. Hence to adjust the lunar months with the Ṛtu, they devised the system of Adhimāsas. The

1. MBH : Virāta. 52/3 पंचमे पंचमे वर्षे द्वौ मासावुपजायतः ।।

over-correction caused by the Adhimāsas or Saṃsarpas was cut down by taking one Kṣaya Māsa or Aṃhaspati (T.S.) 1-4-14, 5-6-7, Vājasaneyi Saṃhitā 7-30, 22-30, 31, Taittirīya Brāhmaṇa 3-8-3. It is to be noted here that the year having one Kṣaya Māsa did not consist of only eleven months. It consisted of twelve months because they used to take two Adhi māsas in that year, one before the Kṣaya Māsa and one after it. The two names of the Adhimāsas were Saṃsarpa and Malimluca.[1]

The custom of taking two Adhimāsas at the intervals of five years continued from vedic age upto the Mahābhārata age, but thereafter, probably during Vedāṅga Jyotiṣa period, the Hindus started taking one Adhimāsa in every third year.[2]

Upto the Mahābhārata era the Indians adjusted the Adhimāsa according to the Moon's position in the Nakṣatras and they named the Lunar months according to the Lunar position, but in a latter period they established the month's relation with the Sun's entry into the next Rāśi (the sign of Zodiac). Thus if the Sun enters into the Meṣa Rāśi,

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1. TS 1-4-14
   संसर्पोस्य अंहस्पत्याय त्वा संसर्प अधिमास अंहस्पति क्षयमास इति माधव भाष्य ।
   VS 5-6-7
   द्वादश रात्रिर्दीक्षितः स्यात् द्वादश मासाः संवत्सरः ।
   त्रयोदश रात्रिर्दीक्षितः स्यात् त्रयोदश मासाः संवत्सरः ।।
   VS 7-30 उपयाम गृहीतोसि ।। मधवे तपस्याय अंहस्पतये त्वा
   VS 22-30, 31
   मलिम्लुचाय स्वाहा अंहस्पतये स्वाहा ।।
2. गते वर्षद्वये चैव पंचपक्षे दिनद्वये ।
   दिवसस्य अष्टमे भागे पतत्येऽकोधिमासकः ।। 45 ।।

the month will be Caitra and so on. This entry of the Sun into a Rāśi is termed as Saṅkramaṇa or Saṅkrānti. If there is no Saṅskrānti in one Lunar Masa, that Māsa was termed as Malimluca. If there were two Saṅkrāntis in one Lunar Māsa it was termed as Aṃhaspati.[1]

Seasonal Month :

Inspite of this system of Adhimāsa they were not satisfied and therefore, they developed months depending on the seasons. Thus they divided Vasanta Ṛtu in two months namely Madhu and Mādhava. Śukra and Śuci composed the Grīṣma Ṛtu, Īṣa and Ūrja the Śarad Ṛtu, Saha-Sahasya, Hemanta and Tapa-Tapasya constitued Śiśira Ṛtu. (Taittirīya Saṃhitā 4-4-11,[2] Suśruta Saṃhitā 6-7)[3]

Their Ārtava māsas were just like the modern seasonal months used in the Scientific Calendar namely January, February etc. We have seen that

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1. Nārad
   रविणा लंघितो मासश्चांद्रः ख्यातो मलिम्लुचः ।
   असंक्रान्ति द्विसंक्रान्ती संसर्पांहस्पती समौ ।।
   Maitreya sūtra :-
   मासद्वये यदाप्येकराशिं संक्रमेतादित्यस्तत्राद्यो मलिम्लुचः शुद्धोन्यः ।।
2. TS 4-4-11
   मधुश्च माधवश्च वासंतिकावृतू शुक्रश्च शुचिश्च ग्रैष्मावृतू नभश्च नभसश्च वार्षिकावृतू इषश्चोर्जश्च शारदावृतू सहश्च सहस्यश्च हैमन्तिकावृतू तपश्च तपस्यश्च शैशिरा वृतू
3. Suśruta 6-7
   तत्र माधादयः द्वादश मासाः । द्वि मासिकं ऋतुं कृत्वा षट् ऋतवः भवन्ति । ते शिशिर वसन्त ग्रीष्म वर्षा शरद् हेमन्ता । तेषां तपस्तपस्यौ शिशिरः । मधुमाधवौ वसन्तः । शुक्र-शुची ग्रीष्मः । नभोः नभस्यौ वर्षाः । इष ऊर्जः शरत् । सहः सहस्यौ हेमन्त इति ।

the Vedic sages knew that the rainy season Varṣā began at the Summer Soltice which falls on 22nd June. The first month of Varṣā Ṛtu was Nabha and so it correlated with a period from 22nd June to 21st July. 22nd July to 21st August was the period known as Nabhasya. From 22nd August Śarad Ṛtu began. Its first month Īṣa extended from 22 August to 22nd September. 23rd September is the Autumnal Equinox. 23rd September to 22 October was the period named as Ūrja. 22 October to 22 November was the first month of Hemanta named as Saha. The second month of Hemanta extended from 22 November to 22 December, which is the Winter Solstice. From the Winter Solistice the Śiśira began. The first month Tapa of Śiśira began with the Winter Solstice at the beginning of Uttarāyaṇa. (Yajuḥ Pāṭha 5). Suśruta Saṃhitā states clearly that Uttarāyana consisted of Śiśira, Vasant and Grīṣma, while Dakṣināyaṇa consisted of Varṣā, Śarad and Hemanta.

Preccession of Equinoxes :

From these records it becomes clear that the sages had discovered the four cardinal points namely the Summer Solstice, Winter Solstice, Vernal Equinox and Autumnal Equinox, which occur according to the scientific calendar on 22nd June, 22nd December, 21st March and 23rd September respectively. It is important to note that these dates never change, at least for some lacs of years. If the Vernal Equinox changes in future by a day, that day

will be labelled as the 21st March and the remaining dates will be arranged accordingly.

The modern science has proved that the Sun's position at the Vernal Equinox gradually shifts in an anticlockwise direction. It is called the Precession of Equinoxes. If the Vernal Equinox changes, the other three cardinal points are bound to change. The rate of the Precession of Equinoxes is 50.2 seconds per year. This rate is also told as one degree per 72 years. Thus if the Vernal Equinox is at 360 degree today, 72 years later it will be at 359 degrees. But if we go on changing the degrees it will cause a trouble, so we do not change the degrees. But in the ancient era, the sages were not using the degrees. They used the stars and Nakṣatras to locate the site of the Moon and the Sun. They observed that the Sun at the Equinox moved backwards on the star path. If today the Sun is at Aśvinī on the Vernal Equinox, 960 years later it will be at Revatī. Each Nakṣatra has a span of 13 degrees and 20 minutes. With the rate of 50.2 seconds per year or one degree per 72 years, it takes 960 years to shift back by 13° 20′ or one Nakṣatra. We do not know whether the ancient Indians calculated this rate of Precession or not, but it is certain that they observed the Precession and were careful enough to record the positions of the Sun on the cardinal points of Solstices or Equinoxes. Even the Noble laureate Mr. Gamow, the world renouned scientist has expressed surprise as to how the Indian sages could observe the Precession of Equinoxes. The ancient Indians knew that the Precession of Equinoxes have anticlockwise direction. It is evident from a statement in the Viṣṇu Purāṇa that the Vernal Equinox was at the beginning of the Meṣa Rāśi and

at the first quarter of Kṛttikā Nakṣatra. Similarly it states that the Autumnal Equinox was at the beginning of Tulā Rāśi and in the fourth part of Viśākhā Nakṣatra.[1] In the case of Meṣa Rāśi 30 degrees is termed as the beginning and not one degree which shows the knowledge of the anticlockwise direction of the Precession.

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1. Viṣṇu P. 2-8-76
मेषादौ च तुलादौ च मैत्रेय विषुवत्स्थितः ।
तदा तुल्यमहोरात्रं करोति तिमिरापहः ।। 76
दशपंचमुहूर्त वै तदेतदुभयं स्मृतम् ।
प्रथमे कृत्तिका भागे यदा भास्वांस्तदा शशी ।। 77
विशाखानां चतुर्थेअंशे मुने तिष्ठत्य ऽसंशयम् ।
विशाखानां यदा सूर्यश्चरत्यंशं तृतीयकम् ।। 78
तदा चंद्रं विजानीयात् कृत्तिकाशिरसि स्थितम् ।
तदैव विषुवाख्योऽयं कालः पुण्योऽभिधीयते ।। 79 ।।

CHAPTER - VI

ANCIENT INDIAN SCIENTIFIC CALENDAR

The ancient Brahmins were careful to record the Nakṣatra of the Sun at Equinoxes or Solstices directly. Indirectly also they did the same job, because they had prepared a beautiful scientific calendar. They recorded the Cāndra Māsa and Tithi as well as the Ārtava Māsa, that is, the seasonal month and the Ṛtu. From the Tithi of the Lunar month we can calculate the Sun's position on the star path. If it was Caitra Pūrṇimā the Sun was definitely 180 degrees away at Aśvinī Nakṣatra. One Tithi means a 12° distance between the Moon and the Sun. At Amāvāsyā Sun and Moon are at one place. When the Moon goes ahead of the Sun by 12 degrees we say that Pratipadā is complete. Thus by the Tithi and Pakṣa we can easily locate the Sun's position in the Nakṣatra cycle. With the help of the Ṛtu and Ayana we can locate the relation of the Sun and the Earth. If it was the beginning of the rainy season, Varṣā, it was the Summer Solstice. The beginning of Śiśira Ṛtu indicated Winter Solstice, and so on. Thus the ancient Indians had prepared a marvellous calendar which is eternal.

If we are thrown on some isolated uninhabitated island, we will forget in a few days the date and the month of the modern scientific calendar and will never be able to tell the date and month thereafter. But a man like me who knows the Indian system a little, will look at the sky at night and will tell the Nakṣatra, Tithi, Pakṣa and the Lunar month. At the most he will have to wait till Pūrṇimā day when he

can definitely tell the Cāndra Māsa. Looking at the rising Sun he can tell the Ayana and Ṛtu. Thus Nakṣatra, Tirthi, Cāndra Māsa, Ṛtu and Ayana are the five important parts of the time-reckoning science of India and are called as Pañcāṅga. Yoga and Karaṇa are added later. The Indian Pañcāṅga is useful in the daily life of an average man. If a man is residing at sea shore he should know the time of high tide and low tide. If it is Pūrṇimā or Amāvāsyā there is surely a high tide, but if the date is 15th or 30th nobody can tell about the high tide or low tide.

The Indian Pañcāṅga is useful in calculating thousands of years. If one writes that some important event happened on 22nd December 1993 and if that piece of writing is found 5000 years in future when the present system of counting the years is lost, who can tell how many years ago the event took place ? Nobody can tell it. But when Vālmīki writes that Rāma was born in Caitra Māsa and in Hemanta we can calculate that Rāma must have been born about ten thousand years ago. I can tell this because at present Caitra occupies the month of Mādhava or April but at Rāma's time Caitra occupied Sahasya i.e. December. Five months are changed due to the precession of equinoxes. At the rate of 72 years for one degree the Sun recedes back 30° in 2160 years. The Sun completes one rotation of 360° in 365 days, that means the Sun moves forwards about one degree per day. 30° forward movement of the Sun makes one month. Therefore precession of 30° during 2000 years makes the seasons shift by one Lunar month of 29.53058 days. The modern seasonal months January, February, etc. are fixed to the season, so we can find out the

shift of the Lunar months. If we use ancient seasonal months Madhu, Mādhava etc. similar calculations can be done. This is so precise a method that if we get the Lunar month and the Ṛtu we can easily calculate the year or approximate period of the event. For example, the rainy season begins in the month of Jyeṣṭha at present but Kālidāsa describes it in the Aṣāḍha. One month's shift shows that Kālidāsa has written the fact 2000 years ago. History accepts this date of Kālidāsa around the beginning of the Christian era. Śrīmad Bhāgavata describes the rainy season in Śrāvana which shows its date about 2000 years BC.

Viṣṇu Purāṇa (2-8-76 to 79) precisely tells that day and night were equal when the sun resided in the first quarter of Kṛttikā Nakṣatra or in the third quarter of Viśākhā. This clearly shows the positions of the Vernal and Autumnal Equinoxes at 26°40′ and 206°40′ respectively at the time of Viṣṇu Purāṇa. In 1982 the Vernal equinox was at 336°11′, Hence it seems that the sun has receded back by 50.29°. At the rate of one degree in 72 years, this shift must have taken 3620 years. It gives the date of Viṣṇu Purāṇa as 1638 BC as the latest.

Viṣṇu Purāṇa has written in clear words that two *Solar* months constitute one Ṛtu. (2-8-70).[1] This is a clear proof that the solar months were in use along with the Lunar months, at the time of Viṣṇu Purāṇa. Yajuḥ Pāṭha also mentions that Māgha Cāndra Māsa and Tapas (i.e. the first Māsa of Śiśira Ṛtu) began with the Uttarāyaṇa. This verse clearly

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1. Viṣṇu. 2-8-70
   द्वौ मासौ चार्कजावृतुः ।

indicates that the Lunar months and the solar seasonal months were used then.

Suśruta Saṃhitā 6/7 indicates that Māgha Māsa and Śiśira Ṛtu began simultaneously, the date being 1640 BC. But it also tells at 6/10 that Varṣā Ṛtu occupied Bhādrapada and Aśvina Māsas. This fact gives the date as 4000 BC. From this it appears that the first edition of Suśruta Saṃhitā was composed in 4000 BC while its second revised edition was composed in 1640 BC.

Maitrāyaṇi Upaniṣad 6-14 tells that Dakṣiṇāyana extended from Māgha to middle of Śraviṣṭhā (Dhaniṣṭha) and Uttarāyaṇa extended from the middle of Śraviṣṭha to Āśleṣā. This shows the Sun at summer solstice at 120°. In 1986 on 21st June the Sun was at 65°40′42″. The difference is 54°19′18″. For this precession, at the rate of 72 years per degree, 3895 years are necessary. So the date is 1909 BC.

Kauṣītaki or Śāṅkhāyana Brāhmaṇa (Bāṣkala Śākhā of Rigveda) advises: "Give oblation during the middle of the rainy season, while looking at Punarvasu Nakṣatra. But in this period in the first Pakṣa the moon does not conjugate with Punarvasu. Therefore give oblation on Amāvāsyā which comes after Āṣāḍha because on that Amāvāsyā the Moon is near Punarvasu. The combination of Amāvāsyā, Punarvasu and rainy season gives fulfilment of all the desires. (Adhyāya 1, Khand 3)".

Here we have to omit the Māsas from Pauṣa to Āṣāḍha, because their first fortnight does not show Punarvasu. Sometimes Āṣāḍha Śuddha Pratipadā does show Punarvasu but not always. Therefore it is clear that Jyeṣṭha and Āṣāḍha were not the months of Rainy season. It means that from Śrāvaṇa the

Varṣā Ṛtu began. At present Varṣā begins from Jyeṣṭha Māsa. This two months' shift indicates that 4320 years have elapsed. Therefore the date of Kauṣītaki Brāhmaṇa is 2320 BC.

Matsya Purāṇa 204/5 asks to offer oblation in Varṣā Ṛtu on Maghā Nakṣatra and Trayodaśī Tithi. Maghā and Trayodaśī can combine only in Śrāvaṇa and Bhādrapada. Thus Śrāvaṇa and Bhādrapada were the two Māsas of Varṣā Ṛtu. So its date is 2000 BC.

Vedāṅga Jyotiṣa – Yajuḥ Pāṭha 6 clearly states "Uttarāyaṇa begins when the sun is at Śraviṣṭhā and Dakṣiṇyana begins with th sun at mid-Aśleṣā". So the date of Vedāṅga cannot be pulled later than 1640 BC.

Garga mentions Uttarāyaṇa with Dhaniṣṭhā and Dakṣiṇāyana at Aśleṣā,[1] the date being 1640 BC. Parāśara mentions Uttarāyaṇa at Śrāvaṇa while Dakṣiṇāyana at Aśleṣā.[2] His date is 1159 BC.

Varāhamihira mentions Summer Solstice at Karkādya or 90° and Winter Solstice at Makarādya or 270°,[3] so his date comes to 520 AD.

Thus we can see a continuity of records of the

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1. Garga
   यदा निवर्तेतऽप्राप्तो धनिष्ठामुत्तरायणे ।
   आश्लेषां दक्षिणेऽप्राप्तस्तदा विद्यान्महद्भयम् ।।

2. Praśaraa
   यद्यप्राप्तो वैष्णवमुदग्मार्गम्प्रपद्यते दक्षिणम्
   आश्लेषां वा महाभयाय ।।

3. Varāhamihira Bṛhatsaṃhitā
   आश्लेषार्धाद्दक्षिणमुत्तरमयनं रवेर्धनिष्ठाद्यम् ।
   नूनं कदाचिदासीद्येनोक्तं पूर्वशास्त्रेषु ।। 1
   आप्राप्य मकरमर्को विनिवृत्तो हन्ति सापरां याम्याम् ।
   कर्कटकमसम्प्राप्तो विनिवृत्तश्चोत्तरां सैन्द्रीम् ।। 4

Sun's position at Solstices or Equinoxes from 2000 BC onwards upto Varāhamihira of 520 AD. Where did this tradition of recording the equinoxes come from ? The tradition came from the Vedas. We have seen earlier that this tradition began around 23920 years BC in Rigveda and Yajurveda. From that antiquity we can trace the custom to the recent time of Vedāṅga Jyotiṣa.

We have seen that the Varṣā Ṛtu according to Rigveda began at the Mṛga Nakṣatra around 23920 BC. The solstices like the Equinoxes, recede back anticlockwise. Therefore there must be some time when the summer solstice was on any other Nakṣatra. Its evidence is in the Rigvedic name "Apabharaṇī". Apa means water. Bharaṇī means filling. How can a star in the sky fill water on the earth ? Of course by inducing the rains. Thus there was a period in the past when the Varṣā Ṛtu began with the sun on Bharaṇī Nakṣatra. Its date comes to 20840 BC. This is a direct evidence. But how can the summer solstice suddenly jump from the Mṛga to Bharaṇī. What about the intervening Kṛttikā and Rohiṇī ? There are evidences about these two also.

Krittikā is a very small constellation having seven stars in it. Even though it is inconspicuous all the minute seven stars are named by Taittirīya Brāhmaṇa 3-1-4-1. All these seven names are related to the rains. (1) Amba means water. The one who gives water is Ambā. (2) Dulā is the name of the second star. Dulā is to swing. All the planets and creatures do swing in the rainy season. So the name is related to Varṣā. (3) Nitatni – In this name the roots may be; Nij = wash, shower water, Nid = to sound, Tan = to occupy cover, produce. All these indicate Rains. (4) Abhrayantī (5) Meghayantī

(6) Varṣayantī. These three names clearly describe the rainy season, when, to begin with, there come the white clouds "Abhra", then come the black clouds loaded with water, "Megha", and then "Varṣā" the rain-showers begin. (7) Cupuṇikā means the one who grows plants and makes the farms green. Pun-Punya means Joy or satisfaction or a pot of water for animals to drink. So this seventh name also points indirectly to rains. Taittirīya Brāhmaṇa 3-1-4-5 states: "The stars of Kṛttikā are hairless but by producing plants they become hairy.[1] The plants are called as hair of the Earth in Muṇḍaka Upaniṣad 1-1-7 and Aitereya Upaniṣad 1-2-4.[2] Śatapatha Brāhmaṇa 2-1-2 calls Kṛttikās as hairy.[3] About Kṛttikā Taittirīya Brāhmaṇa states, in 3-5-7-1, that "Agni is the head, a hump of the sky, the supporter of the Earth; that is why it showers rains because that important location in the sky holds good rains".[4]

Here Agni means Kṛttikā Nakṣatra because Śatapatha 2-1-2 says; Agni means Kṛttikā Nakṣatra.[5]

The important place in the sky holding the rains is nothing else but the Summer solstice, the 22nd

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1. TB 3-1-4-5
   ऋक्षा वा इयमलोमकाऽसीत् । ततो वा
   इयमोषधीभिर्वनस्पतिभिः सलोमका प्रजायता ।
2. Ait up.1-2-4
   त्वक् निरभिद्यत । त्वचो लोमानि ।
   लोमभ्यः ओषधिवनस्पतयः ।
3. Ś Br यत् कृत्तिका स्तद्वै सलोम
4. T Br. 3-5-7-1
   अग्निर्मूर्धा दिवः ककुत् पतिः पृथिव्या अयम्
   अपारेतांसिजिन्वति दिवि मूर्धानं दधिषेसुवर्षाम् ।
5. Ś Br. 2-1-2 एता वा अग्निनक्षत्रं यत्कृत्तिकाः ।

June in the modern scientific calendar. These Ṛcs appear to show the position at that time. Let us see the period of this position. The summer solstice was on Kṛttikā then, but with anti-clockwise motion it has come to Mṛga Nakṣatra at present. Thus the precession through 25 Nakṣatras has taken place. With the rate of 960 years per Nakṣatra this shift must have taken place in 24000 years ago that means, its date is 22000 BC or to be exact 21800 BC.

Before Kṛttikā the Summer solstice should be on Rohiṇī. There is no direct statement about this in Rigveda, at least I have not yet found it. But I got its evidence in a fact recorded in Mahābhārata Vana. 230. Here a dialogue between Indra and Skanda is given where it is stated that Abhijit i.e. the star Vega slipped down in the sky due to Kṛttikā's competition with Vega. Here it shows that Kṛttikās were at the Summer Solstice when the sages observed the gradual fall of Vega. This means that the fall began or was noticed at about 21000 BC. Here Indra tells that formerly Rohiṇī was at the Summer Solstice before Kṛttikā, the datee being about 22000 BC. The fall of Vega was complete at 13000 BC when it became the Polar Star. (Popular Astronomy by Patrick Moore, Encyclopedia Astronomica, Newcomb's Popular Astronomy.)

Vālmīki Rāmāyaṇa tells that the Kula Nakṣatra of the Ikṣvākus was Viśākhā and that of Daitya's was Mūla. The Vernal equinox was at Mūla at 17000 BC, when Daitya dynasty began with Hiraṇyakaśipu and Bali. Ikṣvāku dynasty began with Manu's son Ikṣvāku who ruled the kingdom when Viśākhā was at the Vasanta or Vernal equinox at about 15080 BC. At the time of Manu the greatest deluge took place.

Geologists state that the great flood really took place at about 15000 BC, when the sea level rose by 200 feet, causing havoc on the earth.

The famous Taittirīya Saṃhitā gives the names of all the 28 Nakṣatras and their Deities. From these Deities we can find out the period of selecting the Deity. Before thinking about it we shall concentrate on the clear statement that "Kṛttikā to Viśākhā are the Deva Nakṣatras, which turn the Sun from the South. Anurādhā to Apabharaṇī are the Yama Nakṣatras, which turn the Sun from the North." (Taittirīya Brāhmaṇa 1-5-2-6, 7).[1] This verse clearly indicates that the summer solstice was between Viśākhā and Anurādhā at 213°20′, while the Winter solstice was between Apabharaṇī and Kṛttikā, at 33°20′. This was the position at 8357 BC, according to the late Shri S.B. Dixit.

Let us calculate here. On 22nd December, 1993 the Sun was at 246°22′, while at the time of Taittirīya Saṃhitā the Sun was between Kṛttika and Bharaṇī, i.e. at 26°40′. Due to the precession, the Sun at the Winter Solstice receded back from 26°40′ to 246°22′. There is a shift of 140°18′ or 140.3 degrees. The rate of the precession of Equinoxes is 72 years for one degree. Therefore the shift of 140.3 degrees must have taken place 140.3 x 72 = 10101.6 years ago.

This period shows great antiquity, hence some experts twisted the statement and said that the Vasanta Equinox was at Kṛttikā and Uttarāyaṇa

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1. T. Br. 1-5-2-6-7
कृत्तिकाः प्रथमम् । विशाखे उत्तमम् । तानि देवनक्षत्राणि ।।
अनुराधा प्रथमम् । आपभरणीरुत्तमम् । तानि यमनक्षत्राणि ।।
यानि देवनक्षत्राणि तानि दक्षिणेन परियंति यानि यमनक्षत्राणि तान्युत्तरेण ।।

extended from it upto Autumnal equinox. They are totally wrong because in that case "Deva Nakṣatrāni Dakṣiṇena Pariyanti" holds no truth. In that case the sage would have written "Deva Nakṣatrāni Viṣuveṇa Pariyanti." Even then the real sense of "Pariyanti" which means "to turn" does not show its effect. Deva Nakṣatras which control the sun during Uttarāyaṇa turn or revert the sun from the south, because, till then, in the earlier half of the year, the sun was going to the south and on the Winter solstice the sun had reached the limit of Dakṣiṇa. There was Kṛttikā here who returned the sun from the south towards the north. Had Kṛttikā been on the Vernal Equinox, there was no question of turning the sun. There is a continuous movement of the sun from the Winter solstice to the north upto the Summer solstice and in the centre of this northern course lies the Vernal equinox. Thus taking the Kṛttikā at the Vernal Equinox is a sheer pervertion of the truth in an attempt to reduce the antiquity. We must observe the truth and stick up to the truth fearlessly and accept the antiquity of Taittirīya saṃhitā at 8357 BC.

In support of those experts one may question as to how my meaning is correct ? In my support stands the statement of Rigveda 6-32-5 and Vālmīki Rāmāyaṇa 2-63-15 which state the onset of Monsoon from th beginning of Dakṣiṇāyana. That Monsoon in India begins on 22nd June, the Summer solstice, is a well proven scientific fact now. Hence by Dakṣināyana the Taittirīya Saṃhitā meant the southward journey of the rising sun from Summer solstice to Winter solstice.[1]

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1. Vālmiki Ramāyaṇa Kiṣkindhā. 28-2, 54, 55
   For detailed and full commentary on this subject please see "Vāstava Rāmāyana" 4th edition of Marathi book

In my support is the statement of Taittirīya Saṃhitā itself that "If one consecrates on Phālguna Pūrṇimā, the Viśuvanta, that is, mid-day falls on Aśvina Shuddha 9th, when there is an obstacle (Niraya) by rains. To avoid this Niraya or the obstacle by rains one should consecrate on Caitra full Moon when the Viṣuvanta comes on Kārttika Shuddha Navamī." According to my version the antiquity with rains in Āśvina tally. At present rains start in Jyeṣṭha. At that time rains started in Āśvina. This reveals that the rainy season has shifted by five months. We have seen that in 2160 years the season changes by one month. Therefore the antiquity of Taittirīya Saṃhitā is ten thousand years old. Thus the date of 8000 BC is confirmed.

Taittirīya Saṃhitā gives Mitra as the Deity of Anurādhā. Mitra and Varuṇa were the twin Gods of rains. Mitra means a friend who brought the rainy season and produced crops. Varuṇa stopped the rains at proper times. The Sun entered Anurādhā in Kārttika Māsa and induced rains. It entered Varuṇa's Nakṣatra, Śatatārakā, in Māgha Māsa and stopped rains. Thus the rainy season extended from Kārttika to Māgha - full three months. Thus the Deities of Nakṣatras too indicate the same period of 9400 BC.

Vishākhā has a joint Deity "Indra-Agni." Indra stands for rains and Agni represents heat. Heat and rains together indicate premonsoon of early June in Āśvina Māsa and proves the antiquity of 8000 BC.

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authored by Dr. P.V. Vartak - pages 228 to 233.
अयं स कालः संप्राप्तः समयोऽ द्य जलागमः । 2
मासि प्रोष्ठपदे....। 54
आषाढीं अभ्युपगतो...।। 55 एषा घर्मपरिक्लिष्टा नववारिपरिप्लुता ।

Vālmīki Rāmāyaṇa indicates pre-monsoon in Bhādrapada Māsa proving its date one thousand years later than Taittirīya.

Rigveda 3-57-2 states:[1] "Indra and Pūṣā milch the clouds." This means that the rainy season began with Jyeṣṭhā whose deity is Indra and ended with Revatī whose deity is Pūṣā. This points to a period of 9360 BC to 10280 BC when the Summer solstice was on Jyeṣṭhā.

This view is supported by Rigved. 1-164-19 which states: "O Indra and Soma, you two, rotating like a yoked horse, are supporting this world."[2] These two were rotating, so they appear to be the solstices. Indra is the deity of Jyeṣṭhā while Soma is the deity of Mṛga Nakṣatra. Indra is the Master of Monsoon, so the Summer solstice was at Jyeṣṭhā while the Winter solstice was at Mṛga, when this verse was composed. Mathematically this position seems to show 10230 years BC.

The metaphor of rotating yoked horse reveals their knowledge of the earth orbiting around the sun with the production of the seasons. The Solstices and Equinoxes do rotate like a yoked horse.

When the Mūla Nakṣatra was at the Summer

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1. RV 3-57-2
   इन्द्रः सु पूषा वृषणा सुहस्ता
   दिवो न प्रीताः शशयं दुदुहे ।
   विश्वे यदस्यां रणयन्त देवाः
   प्र वो अत्र वसवः सुम्नमश्याम् ।।

2. RV 1-164-19
   ये अर्वाञ्चस्ताँ उ पराच आहु
   ये पराञ्चस्ताँ उ अर्वाच आहुः ।
   इन्द्रश्च या चक्रथुः सोम तानि
   धुरा न युक्ता रजसो वहन्ति ।।

solstice producing rains it was allotted Nirṛtị as its Deity, because it brought the Monsoon from South-west. The direction Nairṛtya (of Nirṛti) means the south west. It is a well known fact that, in India the south-west winds bring the rains. But we suppose that this knowledge was brought to the fore by the British scientists, in the 20th century AD. Actually this knowledge was achieved by the Indian sages around 11240 BC when Nirṛti was appointed as the Deity of Mūla Nakṣatra which occupied the Summer solstice then.

Earlier to Mūla, Pūrvāṣādhā had occupied the Summer solstice and was bringing the sky-water down to the earth. This was observed and the Deity of Pūrvā was fixed as Udaka, the water, around 12200 BC.

Thus the ancient Indian sages developed astronomical science and the time-reckoning science together. The first attempt was done in 23720 years BC as recorded in Rigveda as well as Yajurveda. Following this ancient tradition, the later sages also recorded the astronomical positions directly by noting the Nakṣatra of the equinox or solstice or indirectly by telling the Lunar month and Ṛtu and Ayana. From this well preserved data, we can trace the civilization from 24000 BC to 520 AD with all the steps of one thousand years. There is no other science than Astronomy which can reveal such steps and details. This is because of the most perfect and ingenious method of time measurement based on astronomical facts, propounded by ancient sages.

Those who disbelieved the efficiency and knowledge of the Rigvedic and Yajurvedic sages or those who could not understand the magnanimity of the intellect of the ancient sages tried to impose

their ideas in the later literature. For example, Yājñavalkya composed Śukla Yajurveda and Śatapatha Brāhmaṇa. There he mentioned that Vasanta, Grīṣma and Varṣā composed the Uttarāyaṇa, while Śarad, Hemanta and Śiśira composed the Dakshiṇāyana. (Śatapatha 2-1-3).[1] This may be a novel idea to hold Uttarāyaṇa as the sun's passage in the Northern half of the earth and Dakṣiṇāyana as that in the Southern half of the earth. One is free to accept this new thought but he should not impose this thought on older one while considering the ancient records. The ancient records clearly state that with the sun's southern passage the rainy season begins. If we mix the two ideas of the different periods, we cannot reach the real date of the work. Unfortunately this mistake is done by many stalwarts including the late B.G. Tilak.

Here one may question: why Śatapatha be taken as later than Rigveda and Yajurveda. The evidence is recorded in the Mahābhārata Śānti. 318 in a story that Yājñavalkya was a disciple of his maternal uncle Vaiśampāyana from whom he got the knowledge of Yajurveda. But then there was some dispute between the two. For that reason Yājñavalkya vomitted out the Yajurveda and then composed a new Yajurveda named as Śukla Yajurveda. Afterwards he himself wrote a Brāhmaṇa on it and named it as Śatapatha.

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1. Ś Br. 2-1-3
   वसंतो ग्रीष्मो वर्षाः ते देवा ऋतवः ।
   शरद् हेमन्तः शिशिरस्ते पितरो स यत्र
   उदगावर्तते देवेषु तर्हि भवति
   यत्र दक्षिणावर्तते पितृषु तर्हि भवति ।

In Śatapatha Brāhmaṇa there is a verse which means that Kṛttikās do not move from the exact east. The late Shri S.B. Dixit found that at the present era Kṛttikās are not on the exact East. They have moved towards the North. From this movement the late Shri Dixit calculated the period of the Śatapatha as 3000 BC.[1] Thus the Śukla Yajurveda and Śatapatha Brāhmaṇa are much later than Black Yajurveda.

The famous Sāyaṇācārya also did the same mistake when he stated "madhu Caītro Māsaḥ" etc. Madhu might have concurred with Caitra māsa at Sāyana's time of 15th century AD, but he applied that to Taittirīya Saṃhitā. It was a great mistake. Blindly following Sāyana, later scholars fell in the same pit. Actually Taittirīya Saṃhitā prepared two separate streams for measuring time – seasonal (solar) and lunar months. Both have to be considered and correlated for fixing the time of any particular event as is done by Yajuḥ Pāṭha, Suśruta Saṃhitā and Viṣṇu Purāṇa. But the later scholars mixed the two streams. Even in the current Pañcāṅgas this mistake is being done. They talk of solar Ṛtu and lunar Ṛtu. It is a great folly. Ṛtu has no relation with the Moon. Ṛtu entirely depends on the sun. Rigvedic people knew this, (Rig 1-95-3) but the modern scholars do not know. That is the tragedy.

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1. Marathi book 'भारतीय ज्योतिषशास्त्राचा इतिहास ' authored by the Late Shri S.B. Dixit.

STARS NAMED SCIENTIFICALLY

We have seen earlier that the Vedic Sages had differentiated the five planets from other luminaries in the sky. There are innumerable stars in the sky, but Vedic people selected the important stars and constellations on the path of the Moon. Collectively they named these luminaries as Nakṣatra. The name is scientific and is defined as "Na Kṣarati Iti" which means: the one which does not move. 28 Nakṣatras are named in Taittirīya Saṃhitā (4-4-10). Rigveda mentions a few. "Though named as Nakṣatra they also move": states the Mahābhārata Śānti. 301 or 290/36 of the B.O.R.I. edition. This means that from Rigveda upto the Mahābhārata, continuous study of stars was being done and finally Mahābhārata Sages came to the conclusion that stars also move. Further study proved that even the Polar star moved.

That is why, the Purāṇas wrote a story of Dhruva, the polar star. Patañjali, the famous yogī knew that Polar star moves. Hence he tells that if we concentrate our mind on the Polar star we get the knowledge of its movement at verse 28 of Vibhūti Pāda.[1]

Some constellations are named according to the apparent shape. For example, Aśvinī suggests the shape of horse. Citrā means bright and beautiful. The name Mṛga shows four hooves of a deer. There is an arrow composed of three stars in between these four hooves. In the line of this arrow at a little

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1. Yoga Darshan - Patañjali
   ध्रुवे संयमात् तद्गतिज्ञानम् ।। 28

distance, there is the brightest star which is named as Rudra or Vyādha, the hunter. Rudra is always accompanied by his wife Umā Gaurī. It is surprising that this star known in Western Astronomy as Sirius is a twin star. Out of these two stars one is a white Dwarf. The name Umā Gaurī suggests the same meaning. Śravaṇa is composed of three stars; a big one in the middle with two small stars-one on either side. This relates to a story of Śravaṇa who carried his father and mother on his shoulder in a special balance-shaped carrier.

The name Jyeṣṭhā is very interesting and is highly scientific. Jyeṣṭhā means eldest and biggest. Jyeṣṭhā is the star Antares. Antares is a red star looking like the planet Mars, almost of the same size and colour. Hence it is difficult to differenciate between Mars and this star. Therefore the Greeks coined the name Antares, meaning a rival of Mars. It is evident that the Greeks say it with unaided eyes. But why the Indians named it as Jyeṣṭhā, the eldest and the biggest ? Actually, if one goes by lustre and size, this star is ranked as 17th among the first 20 stars. Then why is it named as Jyeṣṭhā ? The answer is found in the modern Astronomy which describes that Antares is a red giant approaching steller senility.[1] It is senile, that means it is old, hence is Jyeṣṭhā. It is a giant, 300 times bigger and 2000 times brighter than our Sun, hence it is Jyeṣṭhā. Thus the real picture or description of its size and age is depicted in the very name. The discovery of its size and age by the modern

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1. a) Encyclopedia of Astronomy by Larousse
   b) The story of Astronomy by Patrick Moore
   c) Newcomb's Popular Astronomy.

astronomy is based on the nuclear physics, then is it wrong to assume that in Vedic era the nuclear physics was advanced ? Otherwise, how could the Vedic seers name the star so correctly ?

The Mūla Nakṣatra is called as Mūlabarhi in the Vedas. The name was so given because it is the Mūla or centre or a root from which a Barhi is fanned out. Barhi means a fan. The modern Astronomy has discovered that the centre of our galaxy is really at this star, and from the centre the galaxy has really fanned out spirally. How could the Vedic seers see the fan of galaxy ? Had they efficient telescopes or some other equipment ? We do not know about their equipment but their end result tallies with the modern scientific results.

The stars outside the path of the Moon were also named. Triśaṅku is the name given to a star in the Southern sky known as Crux in the modern astronomy. Actually it does not appear to show the shape of Crux; it is only a rectangle of four stars. The name Triśaṅku suggests that it is three Śaṅkus away. Śaṅku is a number 10^{13} or Thirteen zeros on one. One Mahāyojana means 40 miles. One śaṅku Mahāyojanas means 68 Light years. Therefore, three śaṅkus Mahāyojanas equal to 204 Light years. According to the modern astronomy the star Crux is really 205 Light years distant from us.

Agastya is another scientific name given to the second brightest star Canopus. The famous story tells that sage Agastya sat near the ocean and drank it completely. The point to be taken here is that Agastya was seated near the ocean. Ocean means 'Jaladhi'. Jaladhi is a number 10^{14}, ten times bigger than Śaṅku. So it appears that the star is situated at a distance of one Jaladhi Mahāyojanas. We have

seen above that one Śaṅku Mahāyojanas means 68 Light years, so one Jaladhi Mahāyojanas means 680 Light years. To a great surprise the modern astronomy admits that Canopus is really 650 Light years distant.

NAMES OF STARS WENT FROM INDIA ABROAD

Usually the scholars believe that the names of the stars were imported in to India from the west, particularly from Greece. But this supposition is perhaps not based on facts. On the contrary the names went out all over the world from India. For example, the Great Bear or the Ursa Major. Rigvedic seers named this group of stars as "ṛkṣa". Ṛkṣa has two meanings, 1. a luminary, a star. 2. a bear. This name went from India to Europe where they took the second meaning, the Bear, and began calling the group of stars as Ursa Major. The word 'Ursa' appears to have its origin from 'Ṛkṣa'. Actually the shape of a bear is not clearly seen in the sky; it is to be assumed after the stars are plotted on a piece of paper. However, in a map the images are reversed and become upside down. Hence, even if we imagine a bear on a map, when we actually see in the sky the shape of the bear becomes upside down and becomes impossible to discern. Finding this difficulty the Indian seers changed the name and called the group of seven stars as 'Saptarṣi; four arranged in a rectangular kite-like shape, with a tail of three stars. This change in the name is recorded in Śatapatha Brāhmaṇa 2-1-2-4 dated 3000 BC.[1] This change in the name, somehow, could not go to Europe and the people there stuck to the old name Ursa. But this change went to the South America

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1. Ś B 2-1-2-4
   सप्तर्षी नु ह स्म वै पुरक्षा इत्याचक्षते ।

where the Saptarṣi are not visible, but still, there is a story of seven brothers and one sister pertaining to seven sages and Arundhatī, the wife of Vasiṣṭha. All the seven stars are seperately named in India. The names of the stars from the east towards the west are (1) Ātreya (2) Vasiṣṭha with a minute star Arundhatī (3) Kaśyapa (4) Bhāradvāja (5) Viśvāmitra (6) Gautama (7) Jamadagni.[1]

It is important to note that Mahābhārata records that Arundhatī was formerly behind the star Vasiṣṭha, but at the time of Mahābhārata Arundhatī overtook Vasiṣṭha and went ahead of him. At present Arundhatī is to the east Vasiṣṭha, formerly the minute star was to the west. Scholars hold this change as impossible because Saptarṣis do not move. But this concept is totally wrong. The seven stars are not really linked with each other, the formation is changing in lacs of years as proved by the modern astronomy.[2] Out of these seven stars the first and the last are moving towards the east according to the modern astronomy. Hence it is quite possible that Arundhatī might have changed its position because that minute star is far away from Vasiṣṭha. The record of the Mahābhārata proves that the stars were carefully observed by the Indian seers from Rigvedic era upto the Mahābhārata (See the Figure on page 65) Saptarṣis are not seen in the South America, then how did the story of seven brothers and a sister came up in South America ? The answer is clear that the ancient Indian culture took the story

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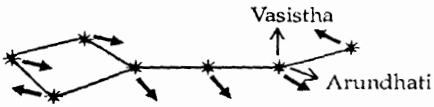
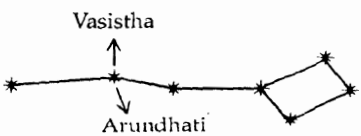
1. MBH Śanti P. 208.
2. a) Encyclopedia of Astronomy by Laroussee
   b) The story of Astronmy by Patrick Moore
   c) Newcomb's Popular Astronomy

As seen in the sky at present. Arrows indicate the direction in which the star is moving.



Saptarshi - Ursa Major
As shown in the map
One Lac years ago

Seen at present



One Lac years in future

Two Lac years in future

to South America.[1] There are many evidences of Indian culture in the South America eg. temples of Śiva, Viṣṇu, Indra seated on an Indian elephant etc. Elephants never inhabitated America, then how could a sculpture of Indian elephant develop in South America ? Natural conclusion is that thousands of years ago Indians were going to America even by aerial route. I have many evidences for this fact published in my Marāṭhī book 'Vāstava Rāmāyaṇa'.

Venus is a planet. Indians named it as "Vena" after a great king 'Vena' from Ikṣvāku dynasty in Rigvedic period (10-123). Vena was in the fifth generation from Ikṣvāku. As thousands of years passed, their king 'Vena' got forgotton. Therefore the Indian seers changed its name from Vena to Śukra after a great sage Śukrācārya. Thus they honoured the intelligence and simultaneously used a descriptive name. Śukra means brilliant. Venus is really the most brilliant among the luminaries of the night sky. The word "Vena" got transformed to "Venus" in Europe but the changed name "Śukra" did not go to Europe, old name Venus continud.

"Śvānau" (or the two dogs namely Canis Major and Canis Minor) was the name given by Rigveda to the stars on either side of the "Patha" or the milky way. (Rig 10-14-11) The four eyed dogs were the guards of the 'Patha' or the Milky way.[2] Rig 4-57-5 describes "Śunaḥ śirau" or the two heads of the dogs. Both refer to Canis major and Canis minor. These are near Orion or Mṛga. The names went from

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1. The Hindu America by Shri Chamanlal
2. RV 10-14-11
   यौ ते श्वानौ यम रक्षितारौ चतुरक्षौ पथिरक्षी नृचक्षसौ ।।

India to Europe as Canis. But in a later period the Indians changed the name. The brightest star was named as Vyādha or Rudra because it is in line with the arrow, while the other was called as Punarvasu. This change did not reach Europe so they used the same old name Canis.

We have already seen that Agastya and Triśaṅku were scientifically named. Rig 10-63-10 tells about Divine ship and Atharva Saṃhitā 5-4-4, 6-95-2 speaks about Golden ship. The same is translated as Navis or Boat. Thus the Vedic names appear original. Vedic seers linked the names with science or history and to keep them in touch they linked their religion with the star names. Thus Yajñas were performed for the Nakṣatras. For example, Kṛttikeṣṭi was a Yajña for Kṛttikās. All the seven stars of Kṛttikās, though minute and negligible, were given importance and were offered oblations in this Yajña. (Taittirīya Brāhmaṇa 3-1-4)[1]

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1. TBR 3-1-4-6
बृहस्पतये स्वाहा । तिष्याय स्वाहा ।

WEEK DAYS ORIGINATED IN INDIA

Just like Yajñas for the Nakṣatras, the ancient Indians performed Yajñas for five planets also. Right from Rigveda the five planets were known as Gods (1-105-10 and 10-55-3). As the planets were honoured as the gods they were offered oblations in Yajñas. For example see Taittirīya Brāhmaṇa 3-1-4-6. The moon was equally honoured and offered oblations e.g. Vājasaneya Saṃhitā 22-30.[1] Thus it appears that everyday the planets including the moon were offered the oblations. Taittirīya Saṃhitā 5-6-7 advises being a "Dikṣita" for six days, that means one should do Yajña every day for six consecutive days. T.S. 7-5-6 advises leaving one day after six days.[2]

Thus a set of seven days is formed. Each day one planet was offered oblation for six consecutive days and then one day was left free. On this day one should not do any Yajña but should offer oblation to the Sun which was held as Ātman. The Sun was honoured from ancient era. Thus the moon and then the five planets were discovered which were held as the gods and worshiped. This is revealed in Rig 1-64-15 which states: "all the seven originated at the same time but the Sun first came

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1. VS 22-30
   चंद्राय स्वाहा । दिवापतये स्वाहा ।
2. TS 5-6-7
   षड्रात्रींदीक्षितः स्यात् षड् वा ऋतवः संवत्सरः ।
   TS 7-5-6
   षडहैर्मासान्संपाद्याहरुत्सृजंति ।

into existence independently, others were born latter".[1] This verse is important from the point of view of Astronomy as well as time measuring science. Astronomy now accepts that the sun was born first and immediately the planets were born from the sun. When the week came into existence, all the seven originated at one time but even then the sun was the first of them.

Taittirīya Saṃhitā (5-6-7) indirectly mentioned the seven-day-week-system and one weekly holiday on Sunday, but other evidences are also present. For example T.S. 7-4-7 mentions a Yajña of 49 days. It was performed by Vasiṣṭha to defeat Sudāsa. 49 days' Yajña cannot be explained on Sun, moon, Nakṣtras, Māsas or Pakṣas. Only the seven-day week system can explain it.

Rig. 1-164-2,3 tell us about seven horses and seven cows of the Sun's chariot. These are nothing but seven days and seven nights of a week.[2] 1-164-5 talks about seven threads of the cloth of a year.[3] These seven threads or fibres of the year's cloth are nothing else but week days. 1-164-12 speaks about seven wheels of a year which are cycles of day and night.[4] Praśna Upaniṣad 1-11 says the same thing.

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1. RV 1-164-15
   साकंजानां सप्तथमाहुरेकजं षडिद्यमा ऋषयो देवजा इति ।
2. RV 1-164
   सप्त युञ्जन्ति रथमेकचक्रमेको अश्वो वहति सप्तनामा
   इमं रथमधि ये सप्त तस्थुः सप्तचक्रं सप्त वहन्त्यश्वाः ।
   सप्त स्वसारो अभि सं नवन्ते यत्र गवां निहिता सप्त नाम ।। 3 ।।
3. RV 1/164/5
   पाकः पृच्छामि मनसाऽविजानन देवानामेना निहिता पदानि ।
   वत्से बष्कयेऽधि सप्त तन्तून् वि तत्विरे कवय ओतवा ।। 5 ।।
4. पंचपादं पितरं ..... सप्त चक्रे षडर आहुरर्पितमिति ।

Thus the week days system is in existence since Rigveda in India and therefore in Vālmīki Rāmāyaṇa (2-26-9) Sītā speaks about Thursday with Puṣya Nakṣatra.[1] This date as I have calculated is 29th November 7306 BC which happens to be Thursday.

Week days are mentioned in the Mahābhārata Ādi Parva 160/7,[2] Kātyāyana Gṛhya Sūtra Kāṇḍa 3 Pañcamī Kāṇḍikā, Mantra 2.[3] The order of the week days is given in Atharva Jyotiṣa 93. Here the planets are called as "Dinādhipa", masters of the day,[4] Yājñavalkya Smṛti, Acārādhyāya tells the same order of the planets suggesting the existence of the week days.[5]

Neglecting all these evidences the scholars go on saying that the Week Day System is developed by the Chaldeans around the beginning of the Christian era.

The order of the names of the Indian week days is very important. It shows the knowledge of the planets. The planets can be divided into two groups

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1. V. Rāmāyaṇa Ayodhyā. 26-9
   अद्य बार्हस्पतः श्रीमानुक्तः पुष्यो नु राघव । 9
2. MBH 160-7
   एकैकश्चापि पुरुषस्तत्प्रयच्छति भोजनम् ।
   स वारो बहुभिर्वर्षैर्भवत्युसुकरो नरैः ।। 7
3. Kātyāyana Gṛhyasūtra 3-5-2
   तत्रोदयनम् आपूर्यमाणपक्षे पुण्याहे
   तिथिवारकरणे नक्षत्रे च गुणान्विते ।। 2
4. Atharva - Jyotiṣa 93
   आदित्यः सोमो भौमश्च तथा बुधबृहस्पति ।
   भार्गवः शनैश्चरश्चैव एते सप्त दिनाधिपाः ।।
5. Yājñav. Smṛti Ācāra. 295
   सूर्यः सोमो महीपुत्रः सोमपुत्रो बृहस्पतीः ।
   शुक्रः शनैश्चरौ राहुः केतुश्चैते ग्रहाः स्मृताः ।

– internal and external. The planets are orbiting around the Sun. Planets between the Sun and the Earth are called as the Internal Planets while those outside the earth are External Planets. In the week day system first Sun is taken, then the Moon and then alternately one external and one internal planets are taken. This shows that the Indians knew the distances of the planets from the Sun.

We have already seen that there were lunar months and years as well as solar months and years developed by Vedic seers. At the same time they had devised one simple year of 360 days, namely "Sāvana" year, which was being used for Yajña purposes. This was easy, no doubt, but then there was a deficit of 5.25 days every year. These were adjusted with the Sun's position by taking 6 redundant days in Āśvina māsa according to the Taittirīya Saṃhitā 7-4-7. Why were these six redundant days taken in Āśvina Māsa ? The reason is that at that time the new year began with Kārttika Māsa, because the rainy season began in Kārttika. Āśvina Pūrnimā was at the Summer Solstice with the Sun in Citrā Nakṣatra, the time is about 7400 BC. Thus we can boldly say that Astronomy and the science of time-reckoning was highly developed by the ancient Indians during Rigvedic era. Therefore, Shikṣā 41-42 rightly says that Astronomy is the eye of the Veda. This eye was so keen and efficient that the Vedic seers thought of how the Universe came into existence. Let us consider here the famous Nāsadīya Sūkta - Rigveda 10-129 in detail.

CHAPTER - X

THE BIRTH OF THE UNIVERSE, THE RIGVEDA AND THE MODERN SCIENCE

How the Universe, the Sun and our Earth came into being has been a question of profound interest to all the inhabitants of our globe for the last few centuries. It is only during the past few decades that it became possible to tackle the problem and arrive at a correct scientific solution. It is very surprising to find the most modern scientific concepts of the birth of the Universe mentiond in the most ancient literary work of India, the Rigveda.

Let us consider the famous Nāsadīya Sūkta in comparison with the recent concepts of the Nuclear age. Nāsadīya sūkta is the 129th Sūkta of the 10th Mandala of Rigveda. It narrates thus :

NĀSADĪYA SŪKTA :

MANTRA 1 :

Nasad āsīn no sad āsīt tadānīṃ
Nāsīd rajo no vyomā paro yat
Kim āvarīvaḥ kuha kasya śarmann
Ambhaḥ kim āsīd gahanaṃ gabhīram

Translation :

At that time (of the creation of the Universe) there was no Asat, No sat, no solar system (including stars and planets like earth), no space, nothing else was present. Then what covered on ? Where ? For whose shelter ? What was that unfathomable and profound thing emitting sound ?

"Ambhas" ordinarily means 'Water', but here this ordinary meaning is not acceptable because the Sage has already stated that there was no 'sat' which includes water. Hence we have to find out the real meaning of 'Ambha'. The root 'Ambha' means "to sound", so this word must mean "something producing sound". The running water produces sound, so it is called 'Ambhas'. Thus the root meaning is appropriate. Ambhas means anything which produces sound. "Sat" means things which always exist. "Asat" means things which never exist.

MANTRA : 2

Na mṛtyur āsīd amṛtaṃ na tarhi
Na rātryā ahna āsīt praketaḥ /
ānīd avātaṃ svadhayā tad ekaṁ
tasmād dhānyan na paraḥ kiñcanāsa //

ANVAYA :

Na (not) mṛtyuḥ (death) āsīt (was), aṁṛtam (immortality) na (not) tarhi (at that time). Na rātryāḥ (of night) ahnaḥ (of the day) āsīt (was) praketaḥ (indication). Ānīt (was breathing) avātam (without air) Svadhayā (with self energy) tat (that) ekam (one). Tasmāt (from it) ha (inded) anyat (another different) ha (not) paraḥ (another second) Kiñ cana (some one) āsa (was).

Translation :

At that time (at the birth of the Universe) there was no death, nor immortality. There was no indication of night and day. (At that time there was) only that one breathing without the air with its own

energy. (There was only that one pulsating thing). There was nothing else indeed.

MANTRA : 3

Tama āsīt tamasā gūḷham agre
apraketaṃ salilaṃ sarvam ā idam
Tucchayenābhvapihitam yad āsīt
tapasas tan māhinājāyataikam

ANVAYA :

Tamaḥ (darkness) āsīt (was) tamasā (in the darkness) gūḷham (mystery) agre (to begin with) Apraketam (undistinguishable) salilam (undulating) sarvam (all) ā idam (this) Tucchayena (by light material) ābhu (a thing formed from surrounding) apihitam (covered) yat (which) āsīt (was) tapasaḥ (of heat) tat (that) mahinā (from greatness) ajāyata (developed) ekam (one).

Translation :

At the origin of the universe, there was complete darkness, there was something obscure covered by darkness. It was impossible to understand. It was all undulating. The thing which came into being from the surrounding was enveloped by light matter. That one developed by the greatness of heat.

The usual meaning of "Salila" is water, but this cannot be taken here because Mantra I has already made it clear that the existing things (Sat) were not present at that time. The root meaning of "Salila" is undulating matter and this meaning fits well in this stanza.

MANTRA : 4 :-

Kāmas tadagre samavartatādhi
manaso retaḥ prathamaṃ yad āsīt
Sato bandhumasati niravindan
hṛdi pratīṣyā kavayo manīṣā

ANVAYA :

Kāmaḥ (desire) tad (that) agre (next, later on) samavartata (originate) adhi (great, nice) manasaḥ (in the mind) retaḥ (fine particle) prathamaṃ (to begin with) yad (which) āsīt (was). Sataḥ (existant) bandhum (binding reason) asati (in the non-existant) niravindan (recognised by analytical study) hṛdi (in the heart) pratīṣya (after great thinking) Kavayaḥ (seers) manīṣā (by mind).

Translation :

The great Desire originates from a fine seed of the mind. (In the same way) the existant things (sat) originated from the non-existant things. This fact is recognised by the sages in their hearts after analytical study and great thinking in their minds.

It is interesting to note that Rigveda 10-72-2 and 3 also mention that Sat originated from Asat.

MANTRA : 5

Tiraścīno vitato raśmir eṣām adhaḥ svid āsīd upari svid āsīt.
Retodhā āsan mahimā na āsan svadhā avastāt prayatiḥ parastāt

ANVAYA :

Tiraścīnaḥ (oblique) vitataḥ (scattered) raśmiḥ (strands or rays) eṣām (their) adhaḥ (downwards)

svit (or) āsīt. (was) upari (upwards) svit āsīt. Retodhāḥ (germ-holders) āsan (became) mahimānaḥ (great) āsan (became), svadhā (those who kept aloof or those who surrendered) avastāt (became inferior) prayatiḥ (who tried hard) parastāt (became superior).

Translation :

Rays or strands scattered out, were they oblique or downward or upward ? They became germ-holders and became mighty. Those who surrendered themselves or tried to keep themselves aloof remained inferior while those who tried hard became superior.

MANTRA : 6

Ko addhā veda ka iha pravo cat
kuta ājātā kuta iyaṃ visṛṣṭiḥ
Arvāg devā asya visarjanenathā
Ko veda yata ābabhūva

Kaḥ (who) addhā (thoroughly well) Veda (knows) Kaḥ iha (on this earth) pravocat (can say definitely, can give a lecture) Kutaḥ (from where) ājātā (came, born) Kutaḥ iyam (this) visṛṣṭi (Universe) Arvāk (came later, are modern) devāh (gods) aśya (it's) visarjanena (by great production) atha (now) (after this) Kaḥ (who) Veda (knows) yataḥ (from what) ābabhūva (originated).

Translation :

Who relly knows ? Who in this world can give a talk on whence this great Universe came from ? And whence was it born ? The gods are subsequent

to the creation of the Universe. Who knows then, from what this universe originated ?

MANTRA 7

Iyaṃ visṛṣṭir yata ābabhūva
Yadi vā dadhe yadi vā na yo asya
adhyakṣaḥ parame vyoman tso
Aṅga veda yadi vā na veda.

Translation :

Does he, from whom this universe arose, support it or not ? Does he who is the highest authority of this universe and who is in the super space, know it definitely or not ?

These are the famous seven Mantras from the Nāsadīya sūkta of the Rigveda, 10th Mandal. It contains thoughts about cosmology. We do not know who has formulated these thoughts, because the sage has not mentioned his own name. After a good study of the whole of the universe, that great thinker came to the conclusion that he is nothing in this vast Universe, not even a drop of water in the great ocean. Then why take pains to mention this name ? So he deliberately did not mention his name. Thus we do not know whose thoughts are these.

At the time of the origin of the Universe there was no "SAT" and there was no "Asat". "Sat" means existant, the things which always exist. "Asat" means non-existing thing, which never exist. The words "Sat" and "Asat" have originated after the birth of the Universe and the Earth, after the birth of the human being and when the human bing got knowledge. These words may have been created 25,000 years ago because some of the Ṛcās indicate

that ancient period. Without going into debate on the date of Rigveda, let us assume that 25000 years ago the words 'Sat' and 'Asat' were created. At that time the things which were always perceived, were labelled as 'Sat', the existant. Thus the earth was denoted as 'Sat', water was denoted as 'Sat'. Similarly Sun, Air, Cow, Horse and all such existant things are 'Sat'. It is only after the production of the word sat, that the word 'Asat' was created. The definition of 'Asat' can be like this: "A thing which is not 'Sat' not existing, is 'Asat'". Thus a 'talking cow', a 'flying horse', a 'moving mountain' etc. are all Asat, non-existing.

By these explanations 'Sat' and 'Asat' are now clarified. The things which we can imagine by saying the words 'Sat' and 'Asat' were not present at the time of the birth of the universe, says the great sage in the first stanza.

The matter that was present then, was neither 'Sat' the existant, nor 'Asat', the non-existant. This wording of the sage is very thought-provoking in the modern scientific Age. It is the ultimate truth and true to science.

The sage further says that there was no Rajas. Rajas means Loka. Loka does not mean only human beings. Loka means a place where life can exist. Our earth is a Loka, it is called Bhūloka. There are, in all, such 14 Lokas, Bhū, Bhuvas, Swaḥ, Jana, Tapa, Maha, Satya and Seven pātālas, according to ancient Indian thought. Thus it is clear that Rajas or Loka means a place where life can exist. For presence of life it is essential to have a planet and a Sun according to our present knowledge. Hence Rajas or Loka should be taken as a solar system with earth like planet. The sage has made it clear that at the

time of the birth of the Universe there were no such solar systems. He adds further that there was no space to accomodate such solar systems, and there was nothing else too. In this wording he wants to state that as a layman whatever we know was not existing at that time.

Rajas also means particles, and it is true that at that time there was no particle formation according to the modern science.

If that was the condition, then, at the time of the birth of the Universe, "which covered on instantly ? Where was that cover ? And for whose shelter was it prepared ?" the sage asks. From these questions the sage has made it certain that some cover was formed. That means something was created. What or who made this cover is the question which is left unanswered. The sage indicated by such a question that he did not know who or what made that cover. It is certain that there was a cover, but when there was no space where was this cover formed ? By this question the sage suggests that some space came into existence somewhere. For whose shelter was all this prepared is the third question which is unanswered. The sage admits that he did not know the answer but he has put up the question as a challenge to other wise men.

Next, the sage puts forth the fourth question. What was that unfathomable and vast thing emitting sound ? In this question the sage has used the word "Ambhas" which ordinarily means water. But as he has already mentioned, there was no existant matter at the time of the birth of the Universe, 'Ambhas' could not be taken as 'water'. The root 'Ambhas' means 'to sound' and because the running water produces sound it is known as "Ambhas". Here

there was no water at all. There was something else which was producing sound.

The sage has termed that 'something' as 'Ambhas".

Though the Nāsadīya Sūkta is in the form of a poem, it is important to note that it is not written by an ordinary poet but by a seer with profound knowledge and who could see the future as well as the past. The thoughts of this sage are proved to be perfectly correct by the modern scientists of this Nuclear age. The modern science is engrossed in solving the puzzle of the genesis of the Universe during the last century. During the past 50 years the science is so advanced that it apears to have almost solved the puzzle of the universal genesis.

Stars are part and parcel of the Universe. If we can find out how the stars are born we can easily find out how the Universe was born. To find out the genesis of the stars we have to study the Sun because the Sun is a star nearest to us. That is why modern scientists have studied the Sun first and then have gone to stars and the universe.

While considering the problem of the genesis of the Sun, the stars and the universe, the modern scientists have not at all considered how the space is created. They have assumed that the space was there. On the other hand, the sage has given a thought to the birth of the space too. He has said that the space came into being somewhere. Though our scientists have not put forth such a view, they have accepted it indirectly. The study of the innumerable galaxies scattered through the vast spaces of the universe brought the foremost man in Nebular research, Dr. E. Hubble, to an extremely interesting and puzzling conclusion. Measuring the

radial velocities of these distant stellar systems he noticed that all are receding from us. Without a single exception, all the very distant stellar islands are running away from the earth and the farther they already are the faster they go. Hubble's measurements demonstrated that these recession velocities are ranging up to 60,000 miles per second. If we paint a number of dots on the surface of a rubber balloon, which we then blow up, we get an impression that all the dots are running away from each other. Just like this balloon, Hubble's phenomenon may be explained, that there is a general uniform expansion of the space occupied by the extragalactic nebulae. Two billion years from now, all the stellar islands will have about their present size, but they will be twice as far from one another. On the other hand, two billion years ago, the distances between the stellar islands must have been so small that the nebulae constituted an undifferentiated collection of stars. This conclusion of the scientists shows that the sage is correct in saying that the space originated somewhere and then expanded.

The sage has said that at the time of the birth of the universe there were no solar systems, stars and their planets. This statement is accepted by the modern science. By measuring the relative amounts of the radio active elements like Uranium and Thorium and their disintegration products in different rocks, it is estimated that the solid crust of the earth was formed not later than 1.6 billion years ago. Since the formation of the crust must have taken place soon after the separation of the earth from the sun, we also have by this means a fairly exact estimate of the age of the earth.

The study of the motion of the stars and relative motions of the different steller systems, strongly suggests that the process of star formation took place not earlier than 4 billion years ago. The calculation from the original store of the Hydrogen 35% on the Sun and the conversion of 1% Hydrogen to Helium shows the age of the sun to be 4 billion years. From the half life of Uranium and Thorium it is calculated that the Universe must have been born 4 billion years ago. So before that there were no stars and planets. This modern concept strongly upholds the views of the sage.

The modern science has come to an important conclusion that our Sun is a giant sphere of an extremely hot gas, but it is erroneous to imagine this gas as necessarily being a very rarefied state of matter. Under normal terrestrial conditions the gas is less dense than liquid or solid - this is "'Sat", the existant, but due to tremendous pressure of ten billion atmospheres in the central region of the sun the gas there is compressed to a density 6 times that of mercuy. The mean density of the sun is 1.41 times the density of water. A gas having such a density is neither 'Sat' nor 'Asat' according to definition. So our sage is scientificaly perfect.

We have seen that the gases on the sun are neither "sat" nor "Asat", but the sun is formed of such gases. Stars are also formed of such gases. In the long past all the matter that now forms the separate stars was uniformly distributed throughout space, its average density being 0.000,000,000,000,000,000,000,1, or 10^{-22} times the density of water. What can we say to this matter ? Sat or Asat ? gas or liquid ? Nobody can say so. Hence the scientists named that matter "Ylem". The

same question was challenging our sage, so he coined a new word "Ambhas" after full consideration. This word used by the sage is full of meaning, while that used by modern scientist is without meaning (it is coined by taking initials of Yale University and the two scientists working on this problem). There was a matter, its density was very low, so there ought to have been vibrations, and vibrations mean production of sound. With the modern trend, identified vibrations are known as radiations while all the other unidentified, unknown vibrations which are present in the space are termed as "Sound". Sound does not mean only the waves which are "heard" by us. Those which can not be heard, seen, felt and understood by any means are included in sound. Ambhas means the same sound. Sound and space were correlated by the Ancient Indian sages, which modern science has done now in the 20th century. Though the sage had studied that matter and coined the word 'Ambhas', he could not understand it thoroughly well, hence he put forth the question: "What is that vast unfathomable Ambhas ?" From the very first stanza itself we can imagine the height of the intellect of the sage. In the first line of the stanza the sage mentions that there was no 'Sat' nor 'Asat', no space, no planets and immediately in the next line he questions: "What covered on ?". By this poetic fashion the sage depicts that almost negligible time was lost between the two events. A common man may not agree with the sage but modern scientists do agree. They say that only in half an hour all the basic elements came into being due to atomic reactions after the birth of the Universe (Gamow–birth and death of Sun). Half

an hour is quite a negligible time for the creation of the universe. So the sage is again correct.

For whose well-being was this prepared ? This is the question of the sage which still remains unanswered even in this ultramodern nuclear age.

In the second stanza, the sage says: "There was no death, nor there was immortality". This statement is correct because we have seen that at that time there was no sun and no earth, naturally there was no life, mortal or immortal.

Further, the sage adds that there was no indication of day and night. This statement is also correct, because unless there is a planet rotating and revolving around a sun there can not be day or night. It shows that this reasoning of day and night was known to the ancient sage.

Later on, the sage gives a big shock to the modern brain. He says: "At that time there was only that one breathing without air, with its own energy. Really, there was nothing else". This statement concurrs with the ultramodern concept. Mr. George Gamow, after studying pulsating stars, states in his book, "Birth and Death of sun "thus: "observations of the Doppler effect in the spectral lines of Cephoid variable actually proves that these stars are, so to speak, "breathing" that is, their surface layers are periodically rising and falling". Simile of breathing is used by Gamow, the world famous scientist as well as the ancient sage.

By this simile of breathing one may think of air but the sage has cleared it by saying "breathing without air."

The sage adds: "it was breathing, pulsating with its own energy". This addition is scientifically

correct. Mr. Gamow says: "the pulsations come as a result of a conflict between the nuclear and gravitational energy producing forces in the steller interior".

The statement of the sage that there was only "that one thing" at the time of the birth of the Universe, is also accepted by the modern cosmologists.

Gamow says that there was only one uniform layer of that matter in the space. Sir James Jeans says the same thing. Sir John Lovell states that there was only one fireball from which whole of the Universe appeared after a big bang. Thus all the three great scientists fully agree with the sage.

Mantra 3 reads thus: There was darkness to begin with. There was something mysterious in the darkness. It was impossible to understand. It was all undulating matter (Salila). Ābhu, originated from the surrounding, was wrapped by a light matter. It developed further due to the might of the heat.

It is correct to say that there was complete darkness, because there were no luminous stars to emit light. Even today the space is full of darkness in spite of the light from the sun and other stars. "In that darkness in the space there was something mysterious which was impossible to understand". This statement needs no comments, because it is still unknown. All scientists agree with Helmholtz he states that in the early stages of development all stars are extremely rarefied and comparatively cool spheres of gas. Being cool they did not emit light. Hence it was mystery in darkness.

Gamow says: "Once upon a time at the dawn of the Universe, the stars must have been so dilute

that they occupied all available space, forming a practically continuous gas. Later, under the action of some interal instability, this continuous gas must have broken up into a number of separate clouds or gas-drops". Because there was gas, instability, separation and cloud formation, there must have been some movement or undulations. This whole concept is described in one word "Salila" by our sage. A matter like gas which has instability and undulations is called "Salila". How much precise and scientific terminology is used by our sage ! For that undulant cosmic gas he has used the word "Salila".

The gas drops formed from the cosmic gas were enormous, with a diameter of about two to three light years and a mass of about 1000,000,000,000,000,000,000,000,000,000 kg. (10^{30} kg.). These gas drops formed from the surrounding cosmic gas were named by the sage as "Ābhu". The name itself defines the formation. "The Ābhu which came into being from the surrounding was covered by some light matter, "says the Ṛṣi. This agrees with the modern scientists, because they say that the forces of gravity do work in such gas drops, which then contract and become the ordinary stars. When the gravitational forces work there will be collection of dense matter in the centre and light matter at the periphery. Thus it will be covered by the light matter. "That one came into being by the greatness of the heat". This statement of the sage is also correct according to the modern science, because the scientists have mentioned several times that in the early stages of their development all stars are extremely rarefied and comparatively cool spheres of gas, which become hot and luminous as the result

of their gravitational contraction. (The contraction Hypothesis of Hermann von Helmholtz, a famous German physicist). Thus it is the heat which transforms a cool gas drop into a star and proves the greatness of the sage.

When we, the common people, read all this science, we think it to be unbelievable, but it is the truth and to show it as a truth, the sage has written the 4th Mantra. In this Mantra he tells that the great worldly desire comes from the minute, invisible, unworldly seed of mind, in the same way "Sat", the existant things, came from the non-existant things "Asat". The Yogīs with far reaching intelligence have recognised this fact after complete thinking in the mind and thorough scanning in their hearts.

We have seen in Mantra 3 that the Ābhu was formed. The mantra 5 states that strands scattered from the Ābhu.

'Raśmi' means Rays or strands. Both these meanings are acceptable in this first sentence. Because this Ābhu was very hot, it was possible for the rays to be radiated out. As the Ābhu was formed of some rarefied gas, it was also possible that some strands of the gas were scattered, just like the strands coming out from a cloud. The meaning "strands" fits well in the whole of the 5th Mantra. Many photographs taken from mount Wilson have proved that such strands do come out from the gaseous Nebulae.

The Spiral Nebulae in Ursa Major, Canes Venatici, Andromeda and Coma Berenices and Gaseous Nebulae in Orion do show such strands coming out. Some nebulae are named 'Filamentary Nebulae" e.g. Cygnus, because of their strands or filaments.

About these strands the sage questions, whether they are oblique or downwards or upwards ? The question indicates that there were no directions as up and down, at that time. Even today in the space there are no such directions. The question also indicates that there were strands in all directions.

The sage next says that some of these strands became the seeds or germ-holders and grew bigger. Those which kept themselves aloof remained small but those which tried to attract others, ("Prayati" as named by the sage) became mighty.

From the Ābhu due to its centrifugal force or some other cause some matter could have been thrown out in strands. Some of the matter from those strands came together to form a germ-holder. The matter which was scattered in the space started gathering around these germ-holders and many bodies were formed. Some of these bodies held themselves aloof, so they remained of the same size, these are named as "Svadhā". Other bodies tried to absorb more and more matter and they became enormous. These enormous bodies ('Prayati' as called by the sage) absorbed some small bodies also in themselves, by gravitional force.

A great German Philosopher Immanuel Kant formulated the first scientifically acceptable hypothesis about the origin of the planetary system, more than a century ago.

This hypothesis was developed by equally famous french mathematician Pierre Simon de Laplace. But this hypothesis was said to be incorrect till a young German physicist Carl Von Weissacker supplied more information about composition of the sun and on that basis proved the hypothesis to be correct. Later on, Kuiper and Terhar made further

corrections and established the hypothesis which is now accepted. They showed that the sun contained one per cent dust, particles of which came together to get solidified, while the remaining 99% were gases, which were expelled away by the centrifugal force leaving the solid mass of dust behind. This solid mass of dust attracted other dust particles from the surrounding and grew bigger and bigger till they became planets. It is observed that when a small mass bumps against a large mass, the small gets merged into the large mass. In the same way the small planets got absorbed into the larger one and the larger ones became enormous. The same hypothesis is given by our sage using the words Svadhā for small masses and Prayati for large ones.

Which are older ? Stars or Galaxies ? This question is not yet solved. Gamow says that the galaxies were formed from multitude of stars, which presupposes that stars are older than galaxies. Sir James Jeans thinks that the process actually went the other way round. According to him, the primordial gas filling the Universe was first broken up into giant gaseous nebulae forming Galaxies; they separated and then the stars were formed.

Sir Lovell says that there was only one premordial fireball from which stars and galaxies developed. Modern scientists are not unanimous, neither are they confident about their own theory. But our ancient sage is quite confident in saying that the stars and galaxies originated from that one thing the 'Ābhu'.

Lovell's is the most ultra-modern theory which is in support of the sage's theory, proving the supremacy of the ancient intelligence.

Inspite of this clairvoyant and superb

intelligence the sage is modest enough to admit that nobody knows exactly how this Universe came into being. Hence in Mantra 6 he puts a question: "Who, on this earth, can talk decisively on this problem ?" We ordinary people will say quickly that God almighty will tell about it. But the great sage asserts that even the Gods cannot tell, because they themselves are born after the birth of the Universe. Then who can tell the source of the birth of this Universe ? questions the sage in Mantra 6.

In the 7th Mantra he says: "Is it true that the source, from which the Universe came into being, is supporting it ?" In this question he states that the source, the ultimate principle, from which the Universe is born does support the Universe. This statement is scientifically correct, because our earth is supported by the sun from which it is born. It is the gravitational attraction of the sun which causes the earth to rotate around it. Our sun, with its planetary system, is supported by our Galaxy. It is accepted by the modern science that the sun rotates around the centre of the Galaxy, the milky way. This centre of the Galaxy, according to the most modern science, is in the constellation Sagittarius. The same area was taken to be the centre or origin of the Galaxy by the Vedas and hence they gave it the name 'Mūla', meaning the origin. Does it not indicate that the Vedic people were well advanced in science ?

Who supports our Galaxy ? The ultramodern science cannot answer this question. But the sage tells us that the source, from which the Galaxies are formed, that Supreme Authority in the super space is holding all the Galaxies and He knows everything about the origin of the Universe. After definitely

saying so, he questions "Whether He knows all this or not?" This question rouses suspician whether the one who holds the Galaxies is the Supreme or is there any body else higher than that authority ? This chain of higher and higher may be unending. This problem is never solved Neither by the sage with supreme knowledge or by the scientists of the nuclear age.

Thus we can see that the modern scientists with all their ultramodern equipment have not found out any answer to the questions which the sage as left unanswered. Whatever the scientists of the day have not found out yet has also been told by the ancient sage. Then is it wrong if we conclude that the Vedas have recorded the ultimate Truth ? Does it not give credence to the ancient idea that Vedas mean knowledge–past, present and future. Is it not wise to go through the Vedas and revise their meaning on the basis of the ultramodern science ? I request the scientists to do this work for the benefit of the[1] world. [2]

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1. Birth and Death of Sun - Gamow
2. अणुतून अनंताकडे - श्री कर्वे चिः श्रीः

CHAPTER - XI

FORCE OF GRAVITATION

Nāsadīya Sūkta shows indirectly that the Vedic sages had some idea of the Gravitational Force. Praśna Upaniṣad tells elaborately about the gravitation. At Praśna 3/8 it says: "The goddess in the Earth helps the Apāna by supporting it."[1] This is a very important statement which indicates the knowedge of the gravitation. Apāna is told to be present in the anus and the genital organs or the middle part of our body (Payu).[2]

The functions of the Apāna are defecation, micturition, ingestion, digestion and parturition. Apāna throws out the faeces, urine, foetus and also the life. Out of these functions throwing out faeces, urine and foetus need the help of the gravitation force of the earth. It is an experience of all the astronauts that passing of stools and urine is very difficult in the outer space where there is no gravitaiton force of the Earth. We can have our own experience of this fact. While drinking water or swallowing food if we are in erect posture, we can do the act easily but in lying down position it is difficult to drink or swallow because gravitation force works more efficiently in the erect posture than

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1. Praśnop. 3/8
   आदित्यो ह वै बाह्यः प्राण
   उदयत्येष ह्येनं चाक्षुषं प्राणमनुगृह्णानः ।
   पृथिव्यां या देवता सैषा पुरुषस्य
   अपानमवष्टभ्यान्तरा
   यदाकाशः स समानो वायुर्व्यनिः । 18
2. Praśnop. 3/5
   पायूपस्थे अपानं....।

in the horizontal. If we stand on our head with feet high up and try to drink or swallow it would be very very difficult, because in that position the gravition does not come to support the Apāna. Thus whatever sage Pippalāda tells is a perfect truth, he knew Gravitation well.

While commenting on this Upaniṣad, Ādi Śaṅkarācārya writes: "If the famous Goddess of the Earth would not pull down this body by supporting Apāna, this body would have floated anywhere in the space or fallen down."[1] This statement clearly shows that Ādi Śaṅkarācārya knew very well about the Gravitation Force of the earth. Our scholars hold that Newton in the seventeenth century discovered Gravitation, which is wrong. Our Vedic seers knew it 25000 years ago. Sage Pippalāda of Praśna Upaniṣad knew it around 7000 years ago and Ādi Śaṅkarācārya knew it at about 700 - 800 AD latest. Thus India knew the Gravitaiton about, at least, a thousand years before Newton. Newton should be credited for the mathematics of the Gravitation Force and not the original concept of Gravitation.

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1. Śāṅkara bhāsya
तथा पृथिव्यामभिमानिनी या देवता प्रसिद्धा
सैषा पुरुषस्य अपानमपानवृत्तिमवष्टभ्याकृष्य
वशीकृत्याध एवापकर्षणेनानुग्रहं कुर्वती वर्तत इत्यर्थः ।
अन्यथा हि शरीरं गुरुत्वात् पतेत्सावकाशे वा उद्गच्छेत ।

SPACE TRAVEL AND ELONGATION OF LIFE

Probably based on these thoughts about the Gravitation and functions of Apāna, the sage Vyāsa, the famous author of the epic Mahābhārata, has written a story of Revatī and Kakudmi, suggesting elongation of life by the space travel, in Śrīmad Bhāgavata, Skandha 9, Adhyāya 3, Ślokas 27-36. King Kakudmi with his marriageable daughter Revatī left the earth and went into the space to reach Brahma Loka, which means some planet from another solar system. He asked Brahma Deva to suggest the husband for his daughter Revatī. Brahma Deva told him that in a moment of Bhrahma Loka, 27 Catur Yugas had ellapsed and those fellows of whom Kakudmi was thinking were dead and their gotras (dynasties) had also vanished from the earth during that time. Then he further said that Balarāma was then born and he should marry Revatī to Balarāma. Kakudmi did accordingly, after returning to the earth.

This story tells very important scientific facts revealed by the present-day advanced science: (1) at least (27x4x2)=216 years had passed on the earth which equalled one moment of Brahma Loka. Thus Vyāsa knew that the time passes at different speeds on different planets, in the space. (2) Aging factor had stopped working on Kakudmi and Revatī so that Revatī remained full of youth and marriagable and her father did not die in 216 years.

On returning to the earth they found that all their descendents had passed away. The two had

defeated death, their life was tremendously extended and their life force was retained unaffected. The only cause attributed was the space travel with high speed.

Praśna Upaniṣad 3/8 tells that Apāna is helped by the gravitation. If gravitation is absent Apāna is bound to fail in its functions. Taking out the life from a living body is one function of Apāna. This function also is likely to fail if gravitation force is absent, so the death was defeated in the space travel.

This ancient Indian thought is supported by the modern science. Einstein first put forth the Theory of Relativity and stated that the Time expands with the velocity as high as that of light alongwith contraction of length. It is observed that subatomic particles, like Meson, whose life is measurable in seconds come from the outer space to the earth after travelling for many days. How can they survive for such a long time ? How does their life extend ? The modern science says it is due to the high speed and lack of gravitaiton force.

Vyāsa has already said 3500 years ago in Śrīmad Bhāgavata, what Einstein says now. Both have no direct proof. It is our duty to experiment and find out a direct proof.

THE VELOCITY OF LIGHT

So far we have noticed highly advanced scientific thoughts in Rigveda. So it is not impossible that Vedic sages thought about the light and its speed. Rigveda 1-50-4 speaks about the high speed of the light and states that the sun quickly invades the whole world. In the commentary on this Ṛc, Sāyaṇācārya writes: "It is remembered that the sunlight travels two thousand two hundred and two Yojanas in half a Nimeṣa."[1]

One Yojana is equal to 9 miles, 110 yards = 9 1/16 miles = 9.0625 according to one publication of the Government of India. According to Mahābhārata, Śānti Parva, 231 half a Nimeṣa equals to 8/75 seconds. If calculated on this data the velocity of light comes to 187084.1 miles per second. According to Michelson it is 187372.5 miles per second.

Sir Monier Williams gives one Yojana equal to 4 Krosha = 9 miles. Taking 1 yojana = 9 miles, the velocity comes to 186413.22 miles per second. The well accepted popular scientific figure is 186300 miles per second. In any case the velocity of Light mentioned by Ṣāyaṇa is almost the same as in the modern science. Sāyaṇa wrote his commentary in

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1. RV 1-50-4
   तरणिर्विश्वदर्शतो ज्योतिष्कृदसि सूर्य्य ।
   विश्वमाभासि रोचनम् ।। 4
   cf. Sāyaṇa on it
   तथा च स्मर्यते-योजनानां सहस्रे द्वे द्वे शते
   द्वे च योजने । एकेन निमिषार्धेन क्रममाण नमोस्तु ते ।।

the 15th century AD, while the modern science found out the velocity of light in 20th century. This is really praiseworthy for India.

The seven rays of the sun-light are mentioned in Rig. 8.72-16,[1] These are nothing else but the seven colours–Violet, Indigo, Blue, Green, Yellow, Orange, Red of the sunlight.

Rig. 1-164-34 questions: "Where is the end of this earth ? Where is the midpoint of the earth ?" And 1-164-35 records the reply: "This Vedī (altar) is the last boundary of the earth and this Yajña is the midpoint of the earth."[2] From this statement we can infer that Vedic sages knew that the earth was a sphere. For a sphere there is no end and no midpoint because any point can be an end and a midpoint on the sphere.

Yajurveda 23/59/61, 62 questions: "Who knows the midpoint of this world ? I ask you, where is the end of the earth ? Where is the midpoint on the earth ? This Vedī (altar) is the last end and this Yajña is the midpoint of the world." Thus both Rigveda and Yajurveda knew that the earth is spherical.

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1. RV 8-72-16
   अधुक्षत्पिप्युषीमिषमूर्जं सप्तपदीमरिः ।
   सूर्यस्य सप्त रश्मिभिः ।। 16

2. RV 1-164-34
   पृच्छामि त्वा परमन्तं पृथिव्याः पृच्छामि यत्र भुवनस्य नाभिः ।
   पृच्छामि त्वा वृष्णो अश्वस्य रेतः पृच्छामिः वाचः परमं व्योम ।। 34 ।।
   इयं वेदिः परो अन्तः पृथिव्या अयं यज्ञो भुवनस्य नाभिः ।

OTHER PHYSICAL SCIENCES

Vedas did not work only on Astronomy. They had developed other physical sciences as well. Thus agriculture with all its necessary tools were developed. All the weapons and chariots for battles were manufactured, which used iron and steel alongwith wood. Iron-smith and gold-smith were the castewise professions. There were mines of gold, silver and diamonds with other precious stones. Idols of gods, musical instruments like Veena, various types of cloth, various house-hold utencils, alcoholic drinks, and many other articles were manufactured in the Vedic era. Not only this, even the ships and aeroplanes are found described in the Rigveda. Let us see here some references, from the Rigveda.

1-22-2 tells that Aśvinau had wonderful chariots which could fly in the sky.[1]

1-108-1 mentions a chariot which can go to all the Bhuvanas. This means that it can leave the earth and go outside on another planet.[2]

1-116-3 states that Tugra drowned Bhujyu in the sea, but Aśvinau saved him with the help of a vehicle which could fly in the sky and could float on water.[3]

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1. RV 1-22-2
   या सुरथा रथीतमोभा देवा दिविस्पृशा । अश्विना ता हवामहे ।। 2
2. RV 1-108-1
   य इन्द्राग्नी चित्रतमो रथो वामभि विश्वानि भुवनानि चष्टे ।
3. RV 1-116-3
   तुग्रो ह भुज्युमश्विनोदमेघे रयि न कश्चिन् ममृवाँ अवाहाः ।
   तमूहथुर्नौभिरात्मन्वतीभिरन्तरिक्षप्रुद्भिरपोदकाभिः ।। 3

1-116-4 tells that Aśvinau saved Bhujyu with the help of a bird which flew continuously for three nights and three days, and then with the help of three chariots having six horses and one hundred feet they crossed the ocean.[1] The flying bird appears to be an aeroplane. Three chariots having six horses means having an engine of six horse power. Their hundred feet mean hundred oars to propel a boat.

1-116-5 clearly describes a ship with hundred oars used to cross the sea.[2]

1-118-1 requests Aśvins to bring down their chariot yoked with hawks. That chariot was faster than mind, had three yokes and had a speed like wind.[3]

1-118-2 The chariot was trangular, having three wheels and three bars, and was somewhere up in the sky. Hence it was requested to come down.[4]

1-88-1 Maruts are requested to come flying, like a bird, in their chariot full of lightning or electricity as well as brilliant weapons and which had wings of horses.[5]

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1. RV 1-116-4
   तिस्रः क्षपस्त्रिरहातिव्रजद्भिर्नासत्या भुज्युमूहथुः पतद्भिः ।
   समुद्रस्य धन्वन्नार्द्रस्य पारे त्रिभी रथैः शतपद्भिः षळश्वैः ।। 4
2. RV 1-116-5
   अनारम्भणे तदवीरयेथामनास्थाने अग्रभणे समुद्र ।
   यदश्विना ऊहथुर्भुज्युमस्तं शतारित्रां नावमातस्थिवांसम् ।। 5
3. RV 1-118-1
   आ वां रथो अश्विना श्येनपत्वा सुमृळीकः स्ववाँ यात्वर्वाङ् ।
   या मर्त्यस्य मनसो जवीयान् त्रिवन्धुरो वृषणा वातरंहाः ।। 1
4. RV 1-118-2
   त्रिवन्धुरेण त्रिवृता रथेन त्रिचक्रेण सुवृता यातमर्वाक् ।
   पिन्वतं गा जिन्वतमर्वतो नो वर्धयतमश्विना वीरमस्मे ।। 2
5. RV 1-88-1
   आ विद्युन्मद्भिर्मरुतः स्वर्कै रथेभिर्यात ऋष्टिमद्भिरश्वपर्णैः ।
   आ वर्षिष्ठया न इषा वयो न पप्तता सुमायाः ।। 1

1-120-10 Chariot of Aśvinau was horseless.[1]

1-180-10 mentions a new chariot having good tyres and which could fly in the sky.[2]

1-181-3 The chariot had a speed like a water current going down a slope, it had a wider seat for a driver. It had a speed like mind.[3]

1-182-5 Aśvinau prepared a ship which could travel in the ocean with its own power and which had wings to fly.[4]

Aśvinau could fly very easily to heavens from a sea. This was a unique vehicle which could float on the sea and could fly in the sky.

1-182-6 Aśvinau had four ships which could easily cross the sea.[5]

1-183-1 The chariot of Aśvinau was faster than mind, it had three rods and three wheels and was made up of three metals. The birds fly with their

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1. RV 1-120-10
   अश्विनोरसनं रथमनश्वं वाजिनीवतोः तेनाहं भूरि चाकन ।। 10
2. RV 1-180-10
   तं वां रथं वयमद्या हुवेम स्तोमैरश्विना सुविताय नव्यम् ।
   अरिष्टनेमिं परि द्यामियानं विद्यामेषं वृजनं जीरदानुम् ।। 10
3. RV 1-181-3
   आ वां रथोऽवनिर्न प्रवत्वान्त्सृप्रवन्धुरः सुवितायं गम्याः ।
   वृष्णः स्थातारा मनसो जवीयानहंपूर्वो यजतो धिष्ण्या यः ।। 3
4. RV 1-182-5
   युवमेतं चक्रथुः सिन्धुषु प्लवमात्मन्वन्तं पक्षिणं तौग्र्याय कम् ।
   येन देवत्रा मनसा निरूहथुः सुपप्तनी पेतथुः क्षोदसो महः ।। 5
5. RV 1-182-6
   अवविद्धं तौग्र्यमप्स्वन्तरनारम्भणे तमसि प्रविद्धम् ।
   चतस्रो नावो जठलस्य जुष्टा उदश्विभ्यामिषिताः पारयन्ति ।। 6

wings. Similarly that chariot was able to fly in three worlds.[1]

4-36-1 Ṛbhus gave a praise-worthy chariot which needed no horses, no reins. It had three wheels and could fly in the sky anywhere.[2]

4-43-5 Aśvin's chariot comes from the sky and roams in the heavens.[3]

4-44-5 Golden chariot comes from heaven to earth.[4]

5-63-7 The chariot and the sun were in heavens.[5]

7-69-1 Aśvin's chariot was golden and was connecting heaven to the earth. It had powerful horses. Horses cannot go to heavens, so it appears to be horse-powered engine.[6]

7-69-2 Aśvin's were able to go anywhere with

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1. RV 1-183-1
   तं युञ्जाथां मनसो यो जवीयान् त्रिवन्धुरो वृषणा यस्त्रिचक्रः ।
   येनोपयाथः सुकृतो दुरोणं त्रिधातुना पतथो विर्न पर्णैः ।।1
2. RV 4-36-1
   अनश्वो जातो अनभोशुरुक्थ्यो ३ रथस्त्रिचक्रः परि वर्त्तते रजः ।
   महत्तद्वो देव्यस्य प्रवाचनं द्यामृभवः पृथिवीं यञ्च पुष्यथ ।। 1
3. RV 4-43-5
   उरु वां रथः परि नक्षति द्यामा यत्समुद्रादभि वर्त्तते वाम् ।
   मध्वा माध्वी मधु वां प्रुषायन्यत्सीं वां पृक्षो भुरजन्त पक्वाः ।। 5
4. RV 4-44-5
   आ नो यातं दिवो अच्छा पृथिव्या हिरण्ययेन सुवृता रथेन ।
   मा वामन्ये नि यमन्देवयन्तः सं यद् ददे नाभिः पूर्व्या वाम् ।। 5
5. RV 5-63-7
   धर्मणा मित्रावरुणा विपश्चिता व्रता रक्षेथे असुरस्य मायया ।
   ऋतेन विश्वं भुवनं वि राजथः सूर्य्यमा धत्थो दिवि चित्र्यं रथम् ।। 7
6. RV 7-69-1
   आ वां रथो रोदसी बद्बधानो हिरण्ययो वृषभिर्यात्वश्वैः ।
   घृतवर्तनिः पविभी रुचान इषां वोलहा नृपतिर्वाजिनीवान् ।। 1

this chariot. It was famous in all the five parts of the world and posessed three seats.[1]

7-69-3 Aśvin's chariot was able to go upto the border of the heaven.[2]

10-135-3 The chariot was not seen anywhere before. It had no wheels at all. It had only one axis and it was able to go anywhere.[3]

All these twenty two references point to only one vehicle - the aeroplane, a flying machine. Three references suggest a unique vehicle which was able to fly in the sky and float on the sea. At present even in 1994 such a vehicle which can take off from the sea water into the sky, is not manufactured by anybody in the world. Then, is it not our duty to work hard and prepare such a vehicle ?

A very curious and interesting fact here is that many Ṛcs from the above references showing existence of some type of aeroplane are related to the famous Aśvinau. The same Aśvinau were renowned for their mastery over subjects like medicine and surgery.

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1. RV 7-69-2
   स प्रपथानो अभि पंच भूमा त्रिवंधुरो मनसा यातु युक्तः ।
   विशो येन गच्छथो देवयंतीः कुत्रा चित् याममश्विना दधाना ।। 2
2. RV 7-69-3
   स्वश्वा यशसा यातमर्वाग्दस्रा निधिं मधुमंतं पिबाथः ।
   वि वां रथो वध्वा 3 यादमानोऽन्तान्दिवो बाधते वर्तनिभ्याम् ।। 3
3. RV 10-135-3
   यं कुमार नवं रथमचक्रं मनसाकृणोः ।
   एकेषं विश्वतः प्राञ्चमपश्यन्नधि तिष्ठसि ।। 3 ।।

MEDICINE AND SURGERY

It is reported in Rig. 1-116-8 that Aśvinau treated Atri with ice to cure his fever. In the modern medical practice, we many times use ice to control the high fever.[1]

Rig. 1-116-10 reports that Aśvinau rejuvinated the old man Cyavāna and made him youthful again. They lengthened the life of Cyavāna and made him a husband of a virgin or a young girl.[2] 10-39-4 gives the same information.

To cure from the old age and rejuvinate an old man into a youthful husband is almost impossible, in this science age of 1994. But it was done in Vedic age.

1-116-14[3] and 16[4] report that Aśvinau gave normal vision to two blind persons. 10-39-3 States that Aśvinau always helped the blind.

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1. RV 1-116-8
   हिमेन अग्नि घ्रंसमवारयेथां पितुमतीमूर्जमस्मा अधत्तम् ।
   ऋबीसे अत्रिमश्विनावनीतमुन्निन्यथुः सर्वगणं स्वस्ति ।। 8
2. RV 1-116-10
   जुजुरुषो नासत्योत वव्रिं प्रमुञ्चतं द्रापिमिव च्यवानात् ।
   प्रातिरतं जहितस्यायुर्दस्रादित्पतिमकृणुतं कनीनाम् ।। 10
3. RV 1-116-14
   आस्रो वृकस्य वर्तिकामभीके युवं नरा नासत्यामुमुक्तम् ।
   उतो कविं पुरुभुजा युवं ह कृपमाणमकृणुतं विचक्षे ।। 14
4. RV 1-116-16
   शतं मेषान् वृक्ये चक्षदानमृज्राश्वं तं पितान्धं चकार ।
   तस्मा अक्षी नासत्या विचक्ष आधत्तं दस्रा भिषजावनर्वन् ।। 16

1-116-22 reports that Aśvinau produced lactation in an infertile or a sterile cow.[1]

Aśvinau had done some extra-ordinary surgical feats. They implanted the head of a horse to one sage named 'Dadhyaṅga' for some time and then replaced the original human head.[2] Can this be an operation of head transplant ? It may be possible that to repair some defect in the head they decapitated the sage. While repairing the human head they attached the head of a horse, for the time being. After repair, the human head was replaced again. This horse-head might have been an apparatus to maintain circulation or impulses or something else which we do not know at present. In the present era we use Heart-Lung preparation for maintaining the circulation when the heart is under operation. When the heart is repaired or transplanted, we disconnect the Heart-Lung preparation. In the same way the horse-head might have been used for some time and then disconnected.

1-116-15 reports that Queen Viśpalā's lower limb was severed in a battle, just like a bird's wing is cut off. But Aśvinau applied artifical limb to her at night, so that she fought the battle again.[3]

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1. RV 1-116-22
   शरस्य चिदार्चत्कस्यावतादा नीचादुच्चा चक्रथुः पातवे वाः ।
   शयवे चिन्नासत्या शचीभिर्जसुरये स्तर्यं पिप्यथुर्गाम् ।। 22
2. RV 1-116-12
   तद्वां नरा सनये दंस उग्रमाविष्कृणोमि तन्यतुर्न वृष्टिम् ।
   दध्यङ् ह यन्मध्वाथर्वणो वामश्वस्य शीर्ष्णा प्रयदीमुवाच ।। 12
3. RV 1-116-15
   चरित्रं हि वेरिवाच्छेदि पर्णमाजा खेलस्य परितक्म्यायाम् ।
   सद्यो जङ्घामायसीं विश्पलायै धने हिते सत्ते सर्त्तवे प्रत्यधत्तम् ।।15

About Indra a similar information is given at Rigved 8-1-12.[1] Without applying a tourniquet Indra took an incision on neck and sutured the wound and perfectly repaired the part. (This is the translation done by Shri Chitrava Shastri). Sāyaṇa's commentary can be translated thus : Indra uses no medicine, but before bleeding occurs from neck he sutures the wound and repairs the part perfectly.

One may follow any translation, but he will infer that in that ancient Vedic age wounds were sutured and repaired, either by using some medicine or using a tourniquet, but Indra was so expert in Surgery that he used no medicine nor any tourniquet while suturing wounds. This is quite possible for a fast surgeon.

All these evidences prove beyond doubt that in Vedic age medicine and surgery were quite advanced. It is because of this root that Suśruta developed even the Plastic Surgey in the later period. We have already seen the date of Suśruta Saṃhitā as 4000 BC for the first edition and 1640 BC for the revised second edition. Suśruta has advised the use of a skin flap from the forehead to repair and reconstruct a new nose. With this method surgery can be completed in one operation only giving a new nose to the patient. As far as the blood supply and the arrangement of hair are considered the skin of the forehead is very akin to that of the nose, so that the repair and reconstructioon of nose becomes perfect. The same method is now used in the modern Plastic Surgery.

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1. RV 8-1-12
   य ऋते चिदभिश्रिषः पुरा जत्रुभ्यः आतृदः ।
   संधाता संधिं मघवा पुरूवसुरिष्कर्ता विह्रुतं पुनः ।। 12

CHAPTER - XVI

TEST TUBE BABY

There is a passing reference to Test Tube Baby in Rigveda at 7-33-13, where it is mentioned that Mitra-Varuṇa developed from one utensil named as "Vasativara" two sons namely Agastya and Vasiṣṭha. This technique later on got evolved so that in Mahābhārata era Test Babies were developed. These are Kṛpa, Kṛpī, Droṇa, Draupadī and Dhṛṣṭadyumna. These five had no mother. This subject cannot be elaborated here because we are seeing the scientific advances of Rigvedic people. Many years passed after the Rigveda and then Upaniṣads were composed. Let us now see how far the science advanced in Upaniṣadic period. Upaniṣads considered the Brahman or Ātman that is the prime energy behind this Universe.

CHAPTER - XVII

MUṆḌAKA UPANIṢAD

Muṇḍaka Upaniṣad is in the tradition of Atharva Veda. It mentions only Dwāpara Yuga. Kaliyuga is not at all referred to. Hence it must have been written in Dwāpara Yuga before the Kali Yuga began in 3101 BC.

Muṇḍaka (1-1-6,7) describes the Brahman as an energy which is invisible, unperceivable, which has not been generated by anything else, which is eternal and constant, which is all pervading and minutest. Brahman produced everything but remained as it is. It is endless and unexpended.[1] This universe is originated by the Brahman and is occupied by it, just as a spider produces a fibre from its body and weaves a net and occupies it itself. From the earth innumerable plants grow but nothing is expended of the earth. From a person innumerable hair grow but nothing is lost of that person. Similarly all the things in this Universe grow from the Brahman but nothing is spent of it.[2] The modern science has accepted that energy is imperishable, nothing is spent of energy.

Muṇḍaka 1-1-8 says: "Brahman expands due to the heat and then the food grows, from food Life

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1. Maṇḍak. 1-1-6
   यत्तदद्रेश्यमग्राह्यमगोत्रमवर्णमचक्षुःश्रोत्रं तदपाणिपादम् ।
   नित्यं विभुं सर्वगतं सुसूक्ष्मं तदव्ययं यद्भूतयोनिं परिपश्यन्ति धीराः ।। 6

2. 1-1-7
   यथोर्णनाभिः सृजते गृह्णते च यथा पृथिव्यामोषधयः संभवन्ति ।
   यथा सतः पुरुषात्केशलोमानि तथाऽक्षरात्संभवतीह विश्वम् ।। 7

grows, from Life the mind comes into existence."[1] This is according to the modern science. "Heat expands and cold contracts" is a well known principle of Physics. Anything in the world expands due to the heat and that thing is formed of the Brahman, so Brahman must be expanding due to heat. Due to heat even the molecules move away from each other, that means they expand.

There are some exceptions to this rule, for example, water between 0° to 4° Centigrade expands by cold and contracts by heat. But this exception is done by the Brahman itself, because it is the knowledge itself, and it takes care of all the creatures made by it. Let us see the profound knowledge behind this exception. When cold works on water it starts contracting till the temperature reaches 4° Celsius. When the temperature falls down to 3° C it expands. Thus the volume of water at 4° C is minimum while at 3° C and less it has greater volume. Naturally 4° C water is heavy and it remains at the bottom of the river or a pond. 3°C is above that, 2°C is still above and zero degree celsius is at the top. Thus only at the top there is formation of ice, while below the sheet of ice there is water in which fishes and other water creatures live happily. The modern science got this knowledge quite recently, but the animals living on the snow know this phenomenon very well, so that when they become thirsty the snow-dogs and white bears dig up the snow with their claws and drink water.

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1. Mundak. 1-1-8
   तपसा चीयते ब्रह्म ततोऽन्नमभिजायते ।
   अन्नात्प्राणो मनः सत्यं लोकाः कर्मसुचामृतम् ।। 8

Similarly the reindeers with their horns dig up the snow and drink water flowing beneath.

Is it true that the whole Brahman expands due to heat ? If it is true, is there any space outside that Brahman to expand ? According to the Upaniṣadic view there are crores of Brahmāṇḍas situated in the unique Parabrahman. Therefore there is space for Brahma to expand. Moreover it is not possible to heat the whole of Brahman at a time. Some portion of it gets heated and expands while at the same time its other parts get cold and contract. Thus there is balance of both. The same thing happens in the case of ocean. One part of ocean is on high tide while at the same time the other part of it is on low tide, so that there is accomodation for water. The ocean is only a fraction of the Brahman, so we can imagine what will happen in Brahman if we observe what happens in the ocean.

The principle, 'Heat expands' is applicable to inanimate things according to Physics. But according to Upaniṣad it applies to animate things too. Therefore it states that from the expanded Brahma, food is grown. This is absolutely true. Our food consists of plants. A plant grows from a seed but when ? When the seed gets some warmth then only it grows into a plant. If there is no warmth, the seed will not grow into a plant. A small seed grows into a big tree. Is it not expansion ? Our food consists of not only plants but also animals. Many people eat chicken or other birds and also other animals like sheep, hare, etc. A hen lays eggs and then applies warmth of her body to the eggs, then only chicken come out of eggs. If the heat is not applied, eggs will never develop into chicken. Egg is Brahman, chicken is also Brahman – expanded one.

Each and every animal reproduces offsprings only if heat is applied. Thus 'Heat expands Brahman' is true to both, the animate and the inanimate things.

The sage talks of food. What is food ? Food is a thing which supplies energy to any animal. The word used by the sage is Anna.

Anna or food is a thing which gives us energy to move. From where does that energy come. All the flesh-eaters get their food and energy from eating other vegetarian animals, like goat, sheep etc. Vegetarian animals get their energy from the plants and store it in their bodies on which the non-vegetarians depend. The plants get their energy from the earth and water, and store it in their bodies on which depend the vegetarians. The plants grow in earth with water but they need sunlight and air too. If there is sunlight the plants prepare their own food and store in them. Thus the real source of energy are the five basic elements, known as Panch Mahā-Bhūtas–Akāśa, Vāyu, Tejas, Āpaḥ and Pṛthvī. These five Mahā Bhūtas originate from Brahma.

"Life grows from food" says the sage. This is quite true. If by food we take the basic meaning as the five Mahā Bhūtas the statement is correct, because all the living animals are constituted by these five Bhūtas. Every animal contains Ākāśa, Vāyu, Tejas, Āpaḥ and Pṛthvī. Even a microscopic cell occupies some space that means there is Ākaśa. It requires oxygen, so Vāyu is present. It works and shows some temperature, so Tejas is present. It's protoplasm represents Āpaḥ and there are some solid particles in the protoplasm which represent Pṛthvī. Thus life is nothing else but food or the five Mahā Bhūtas. So life grows from the food.

To test this statement we can arrange a simple

experiment which proves that life originates from food. If we take any animal and if we starve it till its stored food is used up, that animal will not be able to reproduce an offspring. Then, if we give it the food in a few days it will reproduce. This simple experiment proves that life is produced by the food.

Many ecologists have found a very good correlation between the number of eggs of birds in a clutch and the food supply. In a year when food is plenty a bird may lay one or two eggs more than in a lean season. Snowy owls – big white birds of Arctic Tundra – feed their chicks on lemmings, the small brown arctic mice. When the lemmings are scarce, there may be only one or two eggs in each owl's nest, but when Tundra is crawling with lemmings the nests may have ten eggs each.

This fact is reported in Science Digest April 1980 and proves the statement of Muṇḍaka that life develops from food.

The sage further states that the mind is produced from the life. This needs no comments, because only a live animal can show presence of its mind. As soon as it dies, the mind also disappears. The inanimate things do not reveal mind. So for the existence of mind life is essential.

Muṇḍaka 1-2-4 states that Kāli, Karāli, Manojavā, Ṣulohitā, Sudhūmravarṇā, Sphulliṅginī, and Goddess Viśvaruci are the moving seven tongues.[1]

Usually scholars hold that these seven tongues

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1. Mundak. 1-2-4
काली कराली च मनोजवा च
सुलोहिता या च सुधूम्रवर्णा ।
स्फुल्लिंगिनी विश्वरुची च देवी
लेलायमाना इति सप्त जिव्हाः ।। 4

are the flames of the fire of Yajña. But in a fire, there cannot be only seven flames. Moreover these seven flames cannot be differentiated from each other and therefore cannot be given names as are given in the Mantra. The sage himself denounces the Yajñas in the 7th Mantra.[1] Thus he is not speaking about the ordinary fire and its flames. He is talking about that Agni which originated from Paramātmā and whose one sacrificial stick is the Sun.[2] (2-1-5). That fire or Agni whose negligible stick is the sun cannot be an ordinary fire. It must be the Brahma itself. 2-1-4 says that this Agni is the head of Paramātmā.[3] If we accept this logical inference we can explain the seven tongues as the seven bands of energy.

Why are they called as the tongues ? It is a metaphor. If a person hides somewhere we cannot recognise his presence, but as soon as he utters something we know that somebody is present. Thus tongue is the means of manifestation. The Brahman is unmanifested because it has hidden itself. Even then it manifests itself sometime somewhere. This

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1. Muṇḍak. 1-2-7
   प्लवा हि एते अदृढा यज्ञरूपा अष्टादशोक्तमवरं येषु कर्म ।
   एतच्छ्रेयो येऽभिनन्दन्ति मूढा जरामृत्युं ते पुनरेवापि यान्ति ।।
2. ibid 2-1-5
   तस्मादग्निः समिधो यस्य सूर्यः
   सोमात्पर्जन्य ओषधयः पृथिव्याम् ।
   पुमान् रेतः सिञ्चति योषितायां
   बह्वीः प्रजाः पुरुषात्संप्रसूताः ।। 5
3. ibid 2-1-4
   अग्निमूर्धा चक्षुषी चन्द्रसूर्यौ
   दिशः श्रोत्रे वाग्विवृत्ताश्च वेदाः ।
   वायुः प्राणो हृदयं विश्वमस्य
   पद्भ्यां पृथिवी ह्येष सर्वभूतान्तरात्मा ।। 4

manifestation is done by seven tongues which can be called as seven energy bands in the modern scientific language. Let us see how perfect are the descriptive terms used by the sage.

(1) Kālī is the feminine gender of Kāla. Kāla is time, it is not perceivable as it is. Time is perceived only by the Sun, in practice. Hence Kālī is the energy of the sun. Actually, Kāla also means the Death, because it comes at the right time destined. The energy behind the real time and death is not yet understood by the modern science. But a part of that basic energy is the solar energy, because the whole life on this earth depends on it. Hence Kālī means solar energy.

(2) Karālī is a word composed of Kara+Ālī. Kara means hand. Kara also means doing. We do something with hand, therefore hand is called as Kara. The root is 'Kṛ' = to do. Thus a force behind doing some work is Kara. This energy does many works, hence she has a row of hands. Therefore that energy is called as Karālī. The energy of fire, heat, sun do many functions, so also the electricity performs many functions. Electricity performs functions as heating, spraying, drying, rotating, lightening, cutting, moulding and so on. Hence she has a row of hands and so is called Karālī.

Usually Karālī means fierce, but this is not the original meaning. If we see a woman having a row of eight hands we will be afraid. From this the meaning "fearful" developed latter.

When I say Karālī means electricity one is bound to suspect, because everybody is sure that electricity was not known to ancient India. But this universal concept is totally wrong. In one book, Agastya Saṃhitā electricity is described.

In one book "Agniyāna" a method of preparing an aeroplane is given. One is advised to have a baloon full of Hydrogen gas and a chariot attached to it. This baloon would take the chariot up in the sky which can be dragged by some trained birds harnessed properly. Agastiya knew the technique of production of Hydrogen gas and also that of gold-plating or electroplating. Agastya tells us how to do all this in his words thus : Take a vessel of clay and put in it a plate of treated copper. Then put copper sulphate, wooden dust and a zinc plate coated with mercury. By the combination of these, Agastya says, Mitrā Varuṇa Teja will be generated, which can analyse water into oxygen and Hydrogen.[1] $2H_20$ = $2H_2 + 0_2$. This is the technique of Modified Daniel cell.

About electroplating, Agastya says: take nitrate of gold or silver and put it into acidic water. By this copper will be plated with gold or silver. Such a gold plated copper was termed as Śātakumbha, because such hundred kumbhas were necessary to perform the job of gold-plating.[2]

Thus it is clear that electricity was known, and was called Mitrā - Varuṇa Teja. Why these two

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1. Agniyāna
संस्थाप्य मृण्मये पात्रे ताम्रपत्रं सुसंस्कृतम् ।
छादयेत् शिखिग्रीवेनार्द्राभिः काष्ठपांसुभिः ।।
दस्तालोष्ठो निधातव्यः पारदाच्छादितस्ततः ।
संयोगात् जायते तेजो मित्रावरुण संज्ञितम् ।।
अनेन जलोभंगोस्ति प्राणोदानेषु वायुषु ।
एवं शतानां कुंभानां संयोगः कार्यकृत्स्मृतः ।।

2. ibid
यावक्षारमये धातौ सुशुक्त जल संनिधौ ।
आलेपयति तत्ताम्रं स्वर्णेन रजतेन वा ।।
सुवर्णलिप्तं ताम्रं च शातकुंभमिति स्मृतम् ।।

Mitra and Varuna ? Because there are two poles- positive and Negative in such a cell, in between which the electric charges run.

Now nobody will hestiate to accept Karālī as electricity.

(3) Manojavā : – Java means speed. Manas is mind. The energy which has velocity like mind is called as Manojavā. Light and electricity have very high speed but they cannot compete with our mind. Light comes from the sun to the earth travelling a distance of 9.25 crores of miles in 8 minutes. We call the velocity of light as the highest, even then it takes eight minutes. But by our mind we can reach the distance instantaneously. So velocity of the mind is greater than that of Light.

The sage tells that such an energy having velocity higher than light does exist. Usually it is held by all the scientists that there cannot be a speed faster than light because according to the founders of the theory of Relativity – Henri Poinkare and Albert Einstein, particles with speed greater than light could not exist. This view was held upto 1962 when it was shown that the arguments of both were not correct. First Dr. E.C.G. Sudarshan, Professor of Theoretical physics at the Seracuse University, New York, alongwith Dr. V.K. Deshpande proposed the hypothesis about the particles faster than light, in 1956. The Physical Review turned down his article several times for six years. In 1962 his article written jointly with O.M. Bilnuik was published in Physical Review, after Feinberg in U.S.A. Tanaka in Japan and Terlsky in Russia had come out with similar postulates. (Science Today Dec. 1968)

Inertia of a relativistic particle increases as its speed increases according to the law.

$$m = m_o / \sqrt{1 - V^2 / C^2}$$

where V is speed of particle

C is speed of light

m_o is inertia of particle, at rest.

As the speed of the particle aproaches that of light the inertia increases very rapidly and the same impulse produces smaller and smaller changes in its speed. There is no likely way of speeding up a particle to a speed greater than speed of light. The speed of light is an absolute barrier for such material particles.

Dr. Sudarshan has shown that it is not possible to cross the light barrier, but particles are created with a speed greater than light. There are two sides to the light barrier, though it cannot be crossed.

There are three classes of particles (1) Less than light speed (2) equal to light, like Neutrinos and Photons (3) faster than light.

Dr. Sudarshan named the particles faster than light as Tachyons. Vedic name for these is Manojavā. The characteristics of a Tachyon are -

1) It is not possible to observe a Tachyon moving slower than light.

2) It is a subatomic particle like Photon or Neutrino.

3) In accordance with quantum theory emission and absorption interchange under transformation from one observer to another.

4) Tachyons slow down when they gain energy and speed up when they lose energy. This behaviour is in contrast with the ordinary particles.

5) As their energy increases without limit, their velocity comes closer and closer to that of light. The

speed of light is the limit which cannot be reached by Tachyon. The light speed is a limit, ordinary particles approaching it from below and Tachyons approaching it from above. Truely the barrier has two sides.

6) Proton and Electron could spontaneously emit a Tachyon when moving with sufficient energy.

7) A light quantum (photon) could shake off a Tachyon. This would manifest itself as 'fatigue of Photon'.

8) Tachyons are electrically neutral.

9) If they had an electric charge, they could act as sources of electromagnetic waves. Since they move super-light speeds, they generate a shock wave of light in much the same way as supersonic aeroplanes generate a shock wave of sound. Such shock waves are not yet found.

10) Muons may emit Tachyon and change its direction.

Thus Tachyons are discovered now supporting the theory of Manojavā propounded by Muṇḍaka Upaniṣad.

(4) Sulohitā :- 'Su' means beyond. 'Lohita' means red. Hence 'Sulohita' means Infra-red and other bands including Heat waves and Radio waves.

(5) Sudhūmra Varṇā :- 'Dhūmra' means smoke, smoke is violet coloured. 'Su' means beyond. Therefore 'Sudhūmra Varṇa' means Ultra -violet and other bands like X-rays, Gamma rays, Cosmic rays.

(6) Sphulliṅginī :- 'Sphulliṅga' means a spark. The energy which produces spark can be called as 'Sphulliṅginī'. Electricity can be termed as 'Sphulliṅginī'. But as the higher and higher energies are mentioned it is better to take nuclear energy as

'Sphulliṅginī' because "Sphul" means to vibrate and Sphulliṅginī means vibrating. Modern science says that an atom and its nucleus vibrate constantly. The subatomic particles like Proton, Neutron and electron also vibrate constantly. Such vibrations are the hall mark or specific characteristic i.e. Liṅga of that energy. Therefore the nuclear energy is called as Sphulliṅginī.

(7) Viśvaruci is the last and the most magnificent energy. 'Ruci' means taste or hunger or appetite. 'Viśva' means the universe. Therefore 'Viśvaruci' means an energy which likes to eat the whole universe. The energy which can eat the universe is Black Hole. If our galaxy goes near a Black Hole it will devour it quickly in no time. The modern science accepts its existence but yet has no knowledge about it. The modern science understood Black Holes recently but Muṇḍaka Upaniṣad recognised its existence thousands of years ago.

All these seven tongues are the seven manifestations of the one and alone Prime Energy called as Parabrahma.

Muṇḍaka 2-1-3 says that from the Paramātman life, mind and the sense organs develop. Similarly Ākāśa (space), Vāyu (gases), Tejas (heat and light) Āpaḥ (water and liquids) and Pṛthvī (earth) came into existence.[1]

The modern science does not know from where the life comes. It is admitted that mind and senses emerge from life. The order of origin of five Maha-bhūtas is surprisingly correct according to the

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1. Muṇḍakop
एतस्माज्जायते प्राणो मनः सर्वेन्द्रियाणि च ।
खं वायुर्ज्योतिरापः पृथिवी विश्वस्य धारिणी ।।33

modern science. The modern science holds that space was existing and in that some premordial gas came up. How the space and gas came up is not considered by the modern science, but Nāsadīya Sūkta of Rigveda has given a thought to it. We have already dealt with it.

Taittirīya Upaniṣad also states that from the Ātman first Ākāśa (space) was born, from Ākāśa developed Vāyu (gases), from Vāyu evolved Agni.[1]

The modern science accepts this order of development. It is true that the premordial gas in the space gave rise to heat because of compression. This heat gave rise to atomic reactions producing energy which effected a blast or big bang throwing out matter. From this matter the stars and planets were formed. Planets were in liquid state to begin with. Jupiter was supposed to be a liquid planet till 1979. It was a liquid planet but now there is formation of rock under the liquid. I have seen this with my own eyes, in Samādhi, on 27th July 1977. My report is confirmed by the "Voyageur", the spaceship of U.S.A. in 1979. The important point to note is that first a planet is in liquid form and gradually it becomes solid. Thus Āpaḥ gives rise to Earth.

Thus the modern science in 20th century has confirmed the order of development of the five Mahabhūtas as stated in Upaniṣads.

The sages were researchers and good observers. Therefore they were bound to disagree on certain

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1. Taitt. Up. Brahman.
तस्माद्वा एतस्मादात्मन् आकाशः संभूतः ।
आकाशाद्वायुः वायोरग्निः अग्नेरापः अद्भ्यः पृथिवी ।
पृथिव्या ओषधयः ओषधीभ्योऽन्नम् । अन्नात्पुरुषः । 2

points. It is for this reason that Aitereya Upaniṣad differs from others on the point of development of Pañca Mahā Bhūtas. Aitereya states in Adhyāya 1, Khaṇḍa 1, Anuvāk 1: "To begin with there was only one Ātman. He thought of producing Lokas. So he produced these Lokas - Ambhas, Marīci, Mara and Apaḥ. Ambhas is beyond the Diva (Teja = Heat and light). It is established above Teja. Antarikṣa is Marīci. Earth is Mara and below it is Āpaḥ."[1]

Here, instead of five, Aitereya quotes only four. But it is no wonder because he has combined Ākāśa and Vāyu in one Ambhas. Probably he went on the same lines as the modern science which takes for granted that some premordial gas in the space was present to begin with: "There was some gas uniformly distributed throughout space, its average density was 0.000,000,000,000,000,000,000, 1 or 10 times the density of water" says Gamow. This rarefied gas was moving. Therefore naturally there was production of sound. Hence it is called as Ambhas. Ambhas means sound.

Marīci means brilliant stars or Nebulae. According to the modern science the uniformly distributed gas comes together to form gas-drops. In these gas-drops the gravitation works and gives rise to pressure on the centre. This causes heat and then they become brilliant. Thus the brilliant

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1. Ait. Up. 1.1:1-2
आत्मा वा इदमेक एवाग्र आसीत् । नान्यत् किंचित् मिषत् स ईक्षत लोकान्नु सृजा इति ।। 1 ।।
स इमाँल्लोकानसृजत अम्भो मरीचीर्मरमापोऽदोऽम्भः ।
परेण दिवं द्यौः प्रतिष्ठान्तरिक्षं मरीचयः ।
पृथिवी मरो या अधस्तात्ता आपः ।। 2 ।।

Nebulae and their product stars are born. They are called as Marīci.

From the stars some material is thrown out and planets are formed. These planets are 'Mara'. On Mara develops Āpaḥ according to Aitereya. Is the wrong ? No. If we consider Mars we immediately understand that it is a planet, Mara. On Mars there is no water at all. Thus Mara is without Āpaḥ. In future water will be formed on Mars. Thus the hypotheśis that first Mara develops and then Āpaḥ develops is also correct. We at present cannot tell certainly what actually happens. Evidences for both are present. Hence we cannot blame Aitereya. On the contrary we have to think on his thesis seriously.

Muṇḍaka 2-1-5 tells that from Paramātman says Agni is born. It's one stick is the Sun. From the wind the rains come. Due to rains plants are grown. From the plants males get development of sperms, which are deposited in the females. Thus from that Paramātman all the animals are born.[1]

We can imagine from this verse that the sage understood the real expanse of Paramātman. Hence he calls the great Sun as a mere stick.

The sage clearly states that rains come from wind. This is absolutely true according to the modern science. It is due to the rains that plants grow. In deserts where there is no rain, no plants grow. So this statement is also scientific. We have

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1. Nand. Up. 2-1-5
तस्मादग्निः समिधो यस्य सूर्यः
सोमात्पर्जन्य ओषधयः पृथिव्याम्
पुमान् रैतः सिञ्चति योषितायाम् ।
बह्वीः प्रजाः पुरुषात्संप्रसूताः ।।5

already seen that the plants are the food of all animals and food is essential for regeneration.

Taittirīya Upaniṣad, Śikṣā Vallī, Anuvāk 5 states: "there were three Vyāhṛtis-Bhū, Bhuvas and Svar, but the son of Mahācamas added fourth one namely Maha. It is Brahma, it is Ātman."[1]

What is Bhū ? Taittirīya says this world is Bhū. Bhuvas is the sky and above it is Svar. From this statement we learn that the earth is called Bhū. The atmosphere is Bhuvas, and the upper-most strata of the atmosphere is Svar. Svar is also called Dyu, which means bright. It is now an established fact that the first layer of atmosphere is really brilliant and beyond it is total darkness. This is because in the space light is not scattered and so it is not visible. As soon as the sun's light enters the uppermost layers of atmosphere it scatters and becomes visible. Thus the upper layers of atmosphere where light gets diffused is Svar.

Formerly it was thought that beyond Svar there was nothing, but the son of Mahācamas discovered that there is a great space beyond Svar. The space being vast is termed as Maha (great).

Vyāhṛti is a mystic word uttered by Brāhmins in performing Sandhyā daily; but its meaning is not understood so far. I think it contains three components Vi + Ā + Hṛti. The root is "Hṛ" which means to take or to win. So Hṛti means a thing

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1. Taittirīya Up: Śikṣā. 5-1.
भूर्भुवस्सुवरिति वा एतास्तिस्रो व्याहृतयः ।
तासामु ह स्मैतां चतुर्थीम् । माहाचमस्यः प्रवेदयते ।
मह इति । तद् ब्रह्म । स आत्मा अंगान्यन्या देवताः ।। 1 ।।

which we must win or earn. The prefix "Vi" shows intensity or greatness. "Ā" as a prefix expresses the sense of "from all sides towards us". Therefore Vyāhṛti means the thing we must posses. As a human being we must have control on the earth, atmosphere, its uppermost rarefied layers, and the dark space beyond. So they are called 'Vyāhṛti'.

Taittirīya Upaniṣad Śikṣā Vallī Anuvāk 10 states: "I am pure and immortal like the Sun".[1] Here Triśaṅku refers to the inner self and says that his inner self is the same as the inner self of the Sun. This statement is scientifically perfect because in the Sun there are subatomic particles-Proton, Neutron, Electron. In us also the same particles are present, so Triśaṅku is correct. He further says "I am very pure (Pavitra)". Really the subatomic particles are pure. There is no chance of any impurity there.

Taittirīya Upaniṣad, around 5000 BC, has given the knowledge which is revealed to the modern science in the 20th century AD.

Taittirīya, Brahmānanda Vallī, Anuvāk 2 states that all the animals residing on the earth originate from food, they remain alive by food and after death they merge with the food.[2] How animals originate from food has already been seen previously. Nobody

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1. Taitt. Up. Śikṣā. 10-1.
   अहं वृक्षस्य रेरिवा । कीर्तिः पृष्ठं गिरेरिव ।
   ऊर्ध्वपवित्रो वाजिनीव स्वमृतमस्मि । द्रविणं सुवर्चसम् ।
   सुमेधा अमृतोक्षितः इति त्रिशंकोर्वेदानुवचनम् ।।
2. Taitt. Up. Brāhma. 2-1.
   अन्नाद्वै प्रजाः जायन्ते । याः काश्च पृथिवीम् श्रिताः ।
   अथौ अन्नेनेव जीवन्ति । अथैनदपि यन्त्यन्ततः ।।

doubts that animals live by eating food. If food is absent, in a few days, animals die. The question arises as to how after death animal merges with food. We see everywhere that dead animals are eaten up by crows, vultures, dogs etc. So dead bodies are food. Those who bury the dead bodies in coffin underground think that the bodies lie there till the end of the world. It is an absolutely foolish idea. Organisms invade the dead body in the coffin and eat it up. Similarly the roots of the surrounding trees pierce the coffin and eat up the body. Thus the buried dead body becomes the food of some living ones. Hindus burn the dead on a pyre, when the heat of the body assimilates with outer heat, Vāyu in the body merges with that outside, Ākāśa in the body joins with Ākāśa outside. Due to heat the water content of the body vaporises and mixes with the water content of the atmosphere. Finally ashes and bones remain which are submered in a river and get mixed with the earth. Thus the five Mahā Bhūtas mix with the outer Mahā Bhūtas which are nothing else but food as is seen earlier. Thus any animal originates from food and mixes with food after death. Taittirīya speaks of the physical body as food body and tells further that inside the food body "Prāṇa" resides. Its shape is the same as food-body and earth is the support of it.[1]

Prāṇamaya body is a separate entity than food body. It is called "Prāṇa", because it supplies force

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1. Taitt. Up. Brahmā 3.
तस्माद्वा एतस्मादन्नरसमयात् अन्योऽन्तर आत्मा प्राणमयः ।
तेनैष पूर्णः । स वा एष पुरुषविधः एव.... पृथिवी पुच्छं ।

to move the physical body. (Pra+Ana = Prāṇa, An = to move). Though Prāṇa is a separate entity, it has got a similar shape. Therefore, if we see the Prāṇamaya body of Mr. X, we can immediately recognise it as Mr. X. At the time of the death this Prāṇa body leaves the food body and goes away. Prāṇa is a gaseous body and it uses oxygen to generate energy so as to move the physical body. Prāṇa is the most important, because animals lead their life following this Prāṇa. Prāṇa is itself the life.

Ghost or Spirit is a universal concept, believed by majority. When people visualize a dead person, it is this Prāṇamaya body which is seen. Being in gaseous form it appears instantaneously and disappears quickly. It can enter a locked room easily. It can move about anywhere on this earth in the atmosphere, because earth is its support.

Why there is apparition of Ghost, if it is a gaseous body ? It is true that gases are usually invisible, so the ghost should also be invisible. It is so usually. But when it wants to appear it can condense its gaseous contents and make appearance. For example, water vapour is invisible but when it condenses its molecules come close together and it becomes visible. When its molecules separate again it becomes invisible. If we keep water boiling, we can see its steam upto a height of say six inches, but above that height steam disappears, because there its molecules separate. Same thing happens in the case of Ghosts or gaseous Prāṇamaya body.

Taittirīya, Brahmānanda vallī further states that inside the Prāṇamaya body resides Manomaya

body.[1] It also has the same shape as the upper bodies. Manas is mind. Mind is nothing else but electro-magnetic waves. Hence this mind body is formed by electromagnetic waves. It is subtler than Prāṇa and controls Prāṇa. Mind is a place where thinking process takes place. Mind thinks over and then guides the Prāṇa body. Due to this inner guidance Prāṇa understands where to carry the physical body. Inside this Manomaya body, the mind body, full of electromagnetic waves, Vijñānamaya body resides. It is a separate entity but its shape is the same.[2] Vijñāna means knowledge or rather a particular limited knowledge. The knowledge sufficient for that particular animal is stored in this body. On the basis of this particular koweldge the mind thinks. For thinking there must be some knowledge present. Without knowledge nobody can think. So this knowledge is provided, as a knowledge body.

Mind means electromagnetic waves, because with the help of Electro-Encephalograph, we can record these waves. But what is knowledge ? The science so far has not understood what knowledge is. But it is present. It forms this body and helps the mind to think on.

The sage further tells that there is still another body inside, separate from the knowledge body. It is called Ānandamaya or Blissful body.[3] Its shape is

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1. Taitt. Up. Brahmā 3.
   एतस्मात्प्राणमयात् । अन्योऽन्तर आत्मा मनोमयः ।
2. Taitt. Up. Brahma 4.
   एतस्मान्मनोमयात् । अन्योऽन्तर आत्मा विज्ञानमयः ।
3. Ibid. 5.
   एतस्माद्विज्ञानमयात् अन्योऽन्तर आत्मा आनन्दमयः ।

the same. This body gives pleasure of life and is also a support. Ānanda means support. It supports the outer four bodies and connects them to Ātman which resides inside this blissfull body.

Uptill now the modern science has not thought of such five bodies. Medical science thinks of only the physical body. It has not yet understood what is life and what is death. It defines life as a vital force which cannot be defined. That means science has no knowledge about the life.

CHAPTER - XVIII

DEATH

What is death ? Nobody can define. Usually it is said that at death the life goes off. Is it really true ? After death we take out the eye ball, kidneys and so many organs, including the heart, and we implant them into another living patient where these organs work. That means, after the death of a person life was present in his eyes, skin, kidneys, heart and other organs. Then how can we say that at death life is gone ? Life is still there but something else has gone. If we call a doctor to take out the eye ball or other organ after a few hours of death, he will not come, because he will say that it is of no use, its life is gone. It clearly shows that after death, life exists in the organs for some time. Then what happens at the time of Death ? My reply is, at the time of death the Prāṇa body with internal three bodies goes away from the food body. Even when Prāṇa goes away, life or Jīva still exists for some time in the food body, and then Jīva also passes off. If we take an organ from the food body whose Prāṇa has gone within a period before the Jīva passes off, that organ can be transplanted in a new food body whose Prāṇa is working. Under the control of the new Prāṇa and taking energy from that new Prāṇa the organ works in the new Annnamaya Koṣa. Thus transplant operations can be easily explained if we accept the theory of five Koṣas.

CHAPTER - XIX

REBIRTH AND DREAMS

Rebirth is now accepted by the science, because there are many examples all over the world that a child of 4-5 years recalls some memories of the past birth and on investigations they are confirmed. Modern science can not explain the rebirth. The theory of five Koṣas can explain rebirth very well. At death the Prāṇamaya Koṣa leaves the food body and goes away. Inside this Prāṇamaya Koṣa the Manomaya, Vijñānamaya, Ānandamaya Koṣas and Ātman are residing. Then this Prāṇamaya the selects a new Annamaya Koṣa, enters into it and establishes connection with it. Memories of previous birth are stored in the mind body so the new Annamaya Koṣa can tell the memories of the past birth.

This mind-body is just like a casette. If a song is recorded on the casette in one tape-recorder and then the casette is transferred to another tape-recorder, it will play the same song. In the same way the mind body when transferred to another physical body may tell previous memories. The memories can be compared with energy packs and Quanta. Each memory or a group of some memories may be stored in one Quantum or energy pack. It can be termed as Mana: Kaṇa.

The dreams which come true have not been explained by the modern science. Science tells that a person sees dreams when his brain is under some tension. This explanation is all right for ordinary or worthless dreams. But it cannot explain why some dreams come true in future. How can a material brain see the facts in future ? Impossible. But if we

accept the presence of Prāṇamaya Koṣa which can leave the physical body and go anywhere in the past and future we get satisfactory explanation. During restful sleep the Prāṇamaya Koṣa leaves the physical body and floats in the atmosphere. It can go anywhere and take experience which is seen as a dream.

By the hypothesis of Pañca Koṣas theoretically, we get explanations of many phenomena unexplained by science like death, rebirth, dream and so on; but Pañca Koṣas are not only theoretical. We can experience these Koṣas in Samādhi. I have done these experiments myself and have experienced these Koṣas in Samādhi.

CHAPTER - XX

ASTRAL PROJECTION TO MARS AND JUPITER

In 1975 news came that U.S.A. is going to launch a space ship Viking I on 20th August 1975 which will land on the planet mars and will send all its information. This was a good opporunity to test the Yoga Śāstra. Therefore, I went into Samādhi on 10th August 1975 to get the knoweldge of Mars. In Samādhi, in no time, I went to Mars. I had a feeling that I was standing on Mars and was looking here and there. I noted that there were no human beings, no animals, no birds, no insects, no planets, no water, no rivers, no ponds. I saw the sky bluish in colour as we see it on earth. There were red, green and yellow colours in the sky on my left hand side. The Sun had set. The evening was beautiful. I felt a breeze which was cool like that in our rainy season. Therefore I thought that there was water content in the air. Otherwise the weather in general was hot and dry. On the dried up river bed I saw red coloured sand and on the banks there were red rocks with black spots. These black patches were of ancient moss which died long back and blackened. So my inference was that there was water and life on the Mars some lacs of years ago.

I got all these 21 points published in "Santa-Kṛpā", a Marathi magazine in its June 1975 issue and also in "Dhārmika", another Marathi monthly in its July 1975 issue. I was harshly criticised by the thinkers, because till then the scientists relied

on the reports of the space ship "Mariner 9" and held that there were human beings on Mars who have prepared water-canals and were doing agriculture. The spaceship had despatched in 1974 some photographs which showed green rectangles of farms and blue lines of water channels.

Viking I was launched on 20th August 1975 and landed on the Mars on 21st July 1976. It sent back messages which proved that there are no human beings, no water canals, no agriculture. Thus all my 21 points got confirmation after eleven months. This proved the ability of Samādhi, in which, only in 5 minutes I got knowledge of the Mars.

On 12th August 1976, I went into Samādhi to see what will happen to Viking I and Viking II which was then approaching the Mars. I saw that Viking I was smaller coppery red object moving from my right hand side to left hand side. It was followed by a bigger object Viking II. Then the "Viking I" slowed down, stopped and taking reverse whose it joined the bigger object "Viking II". This docking programme was going to be a success, but suddenly the scientists of NASA postponed and then cancelled the programme.

I published my report in Taruṇ Bhārat, a Marāthi daily, on 22nd August 1976 and sent one copy to the American Embassy at Bombay on 13 August 1976.[1] The American director denied the

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1. Docking of Vikings 1 & 2 is to be done at a distance of 340 Million kms. after about 10 to 15 days. A clairvoyant person Dr. P.V. VARTAK has peeped into the future to see this remarkable scientific feat. On 12th August 1976, at 11.30 PM he saw the future events within a second. "In the complete darkness of Space I saw two bright objects." Both were copper coloured with pecular glaze.

possibility of docking of Vikings. But The Indian Express of 7th September 1976 published a news from NASA that such docking will take place on 11th September 1976. In the news it was stated that the Vikings were rotating from the East to the West on the Mars. Viking I was followed by Viking II. Viking I would fire its antirockets to come back and join Viking II and then there would be transfer of functions. The programme was arranged on 11th September 1976.

In my report I had published the direction of movement of Viking from my right to left. In a map we plot the East on the right and the West on the

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These were the Vikings. They were going from my right to left. The foremost on my left was Viking 1 and was smaller in size and round in shape. The rear was Viking 2, oblong in shape and more than double the size of Viking 1.In a short time Viking 2 reached Viking 1. Viking 1 appeared to diminish its speed, stopped for a moment and came back to my right towards Viking 2. There are arrangements, circular in shape, for docking, on the back side of Viking 1 and front side of Viking 2. These arrangements came closer, almost touched each other. Both the Vikings rotated through about 45° on the long axis in the direction of their motion. Viking 1 turned from above downwards from my side while Viking 2 rotated from below upwards from my side. Now I thought there would be perfect union of the two, but suddenly something happened and the experiment was pastponed. Viking 1 took high speed and went rapidly ahead to my left. Bigger Viking 2 went behind it, but due to its speed Viking 2 lingered much behind Viking 1..

Actually the experiment was on the point of success but the scientists suspected some mistake. Due to this imaginary fault they directed the Vikings to seperate and postponed the experiment. Had they not done this, the experiment would have been a Grand Success."

left, so my directions were correct. That proves that I was bodily present on the Mars. But how can this happen ? I was sitting in my room at 521 Shaniwar Peth, Pune 411030. I could not go to the Mars with my physical body. The only explanation is that one of my internal, subtler body must have gone to the Mars. It is Vijñānamaya Koṣa.

It is important to note that my Vijñānamaya Koṣa went to the Mars, at least 150 millions of miles away from the earth and returned, in my Samādhi of only 15 minutes. For going into a Samādhi stage and coming out of it takes that much time. Then where is the time left for travel to the Mars and back ? In a fraction of a second this trip to the Mars took place. On the other hand, it is published that the reports from the Viking I on the Mars reached the earth in between 19 to 20 minutes eventhough they travelled with the Velocity of light. This proves that the Vijñānamaya Koṣa has a velocity much higher than that of light. Probably this was known to the author of the Muṇḍaka Upaniṣad, that is why he talks about Manojavā among the seven tongues of Agni.

On 27th August 1977, I went into Samādhi to get knowledge of the planet Jupiter. I was in Samādhi for only 15 minutes between 13.00 to 13.15 hrs. I got my report published in 'Śrī' a Marathi weekly dated 29th October 1977, 'Santakṛpā' of Nov. 1977, 'Taruṇ Bhārat' of 5th February 1978, and 'The

Indian Express' of 22nd May 1978.[1] I sent my report

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1. After performing two successful experiments of Astral Travel to Mars on 10th Aug. 1975 and 12th Aug. 1976, which are proved scientifically, I have made this new venture to travel to the Jupiter, by Astral Body, on 27th August 1977, between 13 and 13.15 hrs. The results are recorded here, at least two years before the reports from Voyager II a space ship sent to Jupiter by U.S.A.
There is preponderance of Yallow and Purple colours on the Jupiter. No other colour was seen in the sky of Jupiter. There was a greenish shade in the yellow which was seen in the sky. The clouds were of the purple colour, they were gathering together rapidly and disappearing. These clouds were quite thick having greater density as compared to our clouds. They were just like moss on our water. If we throw a stone in the pond this moss quickly moves away and quickly comes together, similar was the movement of the clouds of Jupiter.
On the Jupiter there was dim light similar to the light present in Maharashtra at about 7.30 p.m. in the month of September. I could not see the Sun there.
The sky on the Jupiter was not blue like ours but it was darkish. I saw three full moons in the sky situated like the sign of therefore ∴ in mathematics. Then I saw four full moons at a time, as is presented in the figure.: : Later on I saw many moons about five to six, at a time,-- all were half moons. On my right hand was their lighted half portion, while on my left hand was their dark half region. The moons were shining considerably less than our moon, and were smaller in size than our moon, about 3/4th the diameter of our moon.
I saw a group of multiple black round bodies in the sky. In my previous experiment of Mars, I felt that I was standing on the ground of the Mars. But this time I could not feel that, I was standing on the ground of Jupiter. I felt that I was floating.
There was black rock. There was no dust. There was no breeze of wind. There was no sound of any kind. There was no beauty in the sky as was seen in the sky of Mars. So I did not feel enthusiastic and happy. On the contrary,

to the President of India and the Prime Minister Shri Desai on 27th October 1977. In that report I have published 18 points out of which 10 points are coroborated and found true when Voyager went near Jupiter and sent its reports in 1978-79.

In my report I had published that I saw half moon which was a vertical half moon, (we never see such a moon from the earth) with the brilliant

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I felt depressed and morose.

On Jupiter, there was no water, running or stagnant. There was no human being, no beast, no bird, insect, no plant, and no other life. I felt that the Life was never present on the Jupiter. Thickness was felt in the surrounding, as if the density of air was more and the atmospheric pressure was higher than that of the Earth. I felt this by the Tactile sense all over my body.

As I tried to count the half moons which were situated in a hortzontal line, in the sky, suddenly my Dhyāna broke. Immediately after comming to my senses, I saw the watch, it was 13.15. I had started my Dhyāna at 13.00 hours. So within 15 minutes I could see the Jupiter, in Dhyāna and then I wrote down the notes about Jupiter.

Please note that I have seen all the above facts by my eyes, without the help of a microscope or chemical tests. The readers may question how I could see half and full moons at a time. For its explanation let us consider on physical level of the Earth. Actually the travel of 50 crore of miles to Jupiter and back again i.e. 100 crores of mile took no time at all. I could not experience the travel, in a moment I was on Jupiter. At this enormous speed the space and time got contracted, almost vanished., so 8 days between full moon and half moon got contracted to a moment, and I saw both at a time.

I have seen Jupiter on Saturday, the 27th August 1977 and have published this. Whether this is true or not will be established when the report from Voyager will reach us. This scientific experiment on a spiritual phenomenon is done in good faith.

part on my right hand side and dark half on my left side. The Indian Express dated 3rd March 1979 published a photograph of such a moon. Voyager had despatched this photo on 13th February, 1979. This photograph shows a moon, vertical half, but the bright portion is on the left. I had published that the bright half was on the right. Why this mistake ? It is not a mistake at all. My impression was that I was on the Jupiter floating in the sky. From the Jupiter, I saw towards it's moon. The voyager was at a distance of 12.4 millions of miles away from the Jupiter. The moon was, thus, between me and Voyager. Hence my right side was Voyager's left side. Thus, this mirror image photograph is a proof that my subtle body was on Jupiter. That subtle body was Vijñānamaya Koṣa.

Why do I say it was a Vijñānamaya Koṣa ? The reason is given in Taittirīya Upaniṣad which says that Annamaya Koṣa moves on the earth, Prāṇamaya has support of Bhuvas or atmosphere, Manomaya has support of Svar, the highest layer of atmosphere. Vijñānamaya has support of Mahā. Ānandamaya has support of Brahman. From this we can say that the physical body can move with the support of the earth, Prāṇa moves in atmosphere, Manomaya moves in Svar. Upto Svar there is atmosphere under the action of gravitation force of the earth. Outside Svar, in Mahā, there is no gravitation force of the earth. This Mahā gives support to Vijñānamaya. This means Vijñānamaya can move about anywhere in Mahā. Ānandamaya can go anywhere in Brahman. What is the difference in Mahā and Brahman ? I think Mahā is a space outside the gravitation of the earth but within the

gravitation of our solar system. Brahman is the vast enormous expanse outside the solar system.

To go on the Mars or any other planet we must supersede the earth's gravitation. Vijñānamaya has this capacity. Therefore I say that my Vijñānamaya Koṣa went to the Mars twice and on the Jupiter once.

Once, in my Samādhi, I had been to another solar system where on one planet, I saw one human being. He was taller than me and was darker in complexion. He had some clothes on his body. His features of the face were like us, but the hind portion of his head was like a bird, circular in shape. He had powerful forearms. He was engrossed in some thought. As I had been to another solar system, it was Anandamaya Koṣa. I have got this experience published in my Marathi book "The Scientific Explanations of Upaniṣads", Volume Second, page 228, published on 27-10-1982. I cannot say when this will get coroboration from the modern science.

The concept of these five Koṣas is supported by Kaṭha Upaniṣad also. It states that the inner person can roam outside the physical body while it is awake or asleep (1-2-21).[1] How the inner self comes out ? Kath. 2-3-17 says that just as we can seperate the cylindrical pith from a straw of a special kind of grass known as Muñja, in the same way the inner self could be taken out of the physcial body.[2]

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1. Kaṭh Up. 1-2-21
   आसीनो दूरं व्रजति शयानो याति सर्वतः ।
   कस्तं मदामदं देवं मदन्यो ज्ञातुमर्हति ।। 2 ।।

2. ibid 2-3-17
   अंगुष्ठमात्रः पुरुषोऽन्तरात्मा सदा जनानां हृदये संनिविष्टः ।
   तं स्वाच्छरीरात्प्रवृहेन्मुञ्जादिवेषिकां धैर्येण ।
   तं विद्याच्छुक्रममृतं तं विद्याच्छुक्रममृतमिति ।। 7

I shall give the simile of a telescopic aerial of our transistors. We can take out the inner cylinder from the outer. From this we can again take another inner cylinder out. We can do it several times so that the inner-most cylinder comes out. In the same way we can take out the Prāṇa from the physical body, Manomaya from Prāṇa, Vijñānamaya from Manomaya, Ānandamaya from Vijñānamaya and lastly Ātman from Ānandamaya.

If you want to roam in the atmosphere i.e. Bhuvas, take out Prāṇamaya; to go to Svar, take out Manomaya; to go in the Mahā take out Vijñānamaya and wander anywhere in our solar system. If you want to go to another solar system use Ānandamaya. Ātman can roam anywhere in the Brahman.

Here it is interesting to know some thoughts about Mana or mind as told by Taittirīya, in Bhṛgu Vallī Anuvāk 4.[1] He says: "Manas is Brahman. All the animals originate from Manas, they live by Manas and when they pass away they merge with Manas."

Manas means mind, but Vedic Manas is quite different from Mind as considered by science. According to the modern science mind is a function of the brain. Upaniṣads do not take such a narrow view. Taittirīya Upaniṣad tells that Manas is Brahman. That means Manas is present in Brahman. Is it true ? Modern science indirectly agrees with this views. Sir John Lovell, a noble laurate, states in his big bang theory that the first primitive fire ball exploded and from it the Universe came into

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1. Taitt. Up. Bhṛgu.
मनो ब्रह्मेति व्यजानात्। मनसो हि एव खल्विमानि भूतानि जायन्ते। मनसा जातानि जीवन्ति। मनः प्रयन्त्यभिसंविशन्तीति।

existence. He further adds that if there would have been a mistake of a fraction of a secod then Hydrogen would not have been formed, and then the Universe in the present form would not have originated. In this statement he admits that there was no mistake at all. That means there was full knowledge and perfect thought behind the Big Bang. Thus knowledge and mind are present in the Universe right from its birth, even prior to its birth. Where was the brain then ? Hence Manas is Brahman.

The plants have no brain, no nervous tissue at all even then they think. Plants understand from where they are likely to get food and light. Accordingly, they send their roots to get food and leaves to get light. This means, they have knowledge and mind. We can do a simple experiment to prove this. Keep a small tree in a room where there is only one window. In a few days you will find that the tree extends its branches towards the window from where light is available.

"From mind all the animals originate" says Taittirīya. This is true even in plants. When the tree wants to reproduce, it first produces flowers. For pollination, trees need help of insects. To attract the insects, they produce colourful flowers with fragance. If the insects they want are night creatures, the trees produce white flowers with great odour. In the dark, only the white flowers are seen from a distance. Fragrance spreads to long distances so as to attract the insects. Thus it is evident that the trees have knowledge about their friendly insects and they think about what to do. Trees do not want to take the labour of insects free. Therefore trees keep nectar in the flowers for insects to feed on. Thus

there is give and take. Can it take place without knowledge and mind ? Due to insects pollination is effected and fruits develop. Seeds are inside the fruits. If the fruits fall down under the tree and new plants grow there beneath the parent tree, the offsprings will not get sufficient sun light and food. Hence it is wise that seeds go to a remote place. With this deliberation a sweet pulp is created around the seed. Monkeys get attracted to the tree for fruits. They pluck off a fruit, eat the pulp and then they throw away the seed. The work of the tree is done by the monkeys and the work of monkeys (feeding) is done by the trees. Again give and take policy. Can this take place without consideration and knowledge ? Of course not ! These facts prove that trees have the mind and knowledge to think even though they do not have brain.

Do the sperms have mind and knowledge ? Yes. Sperm is a single cell, so there is no question of its having any brain. But the sperms know fully well what to do. Once the seminal fluid is deposited in the vagina of a female, the sperms swim inside, enter the uterus and go to the fallopian tube. There it meets an ovum. Sperm enters inside the ovum and builds a wall around the ovum so as not to allow any other sperm inside. Is there no exhibition of mind and knowledge here ? First time in their life the sperms enter vagina. Human vagina is a canal about four to five inches or ten centimetres long. Sperm is measurable in micron or one thousandth centimetre. So vagina is ten thousand times greater than a sperm, but sperm knows where to go. Why should a sperm prepare a wall to resist entry of another sperm ? Because he thinks that nobody else should enter into his property. This

shows the presence of ego, mind and knowledge. Thus it is proved that mind exists without brain. So mind is all pervading like Brahman. It is termed as 'Virāṭ Manas'. A small fraction of Virāṭ mind is present in the animal and because of it one takes birth.

If we can establish a contact of our mind with Virāṭ mind, we can, through the medium of Virāṭ mind, contact another person's mind. Telepathy can be explained this way.

In Bhṛgu Vallī, Anuvāk 9, Taittirīya tells that inside the earth there is Ākāśa (space) and inside Ākāśa there is earth.[1]

This is a perfect truth as we know it now by science. In the enormous space our earth is floating, but inside the earth there is space where lava is present. We usually translate Ākāśa as space, but there is a lot of difference between space and Ākāśa. The word space has no meaning, but Ākāśa is a meaningful and hence a scientific word. Ākāśa consists fo Ā+kāśa. Ā = not, Kāś means to manifest', or to appear', 'reveal'. The thing which never manifests or appears or reveals itself is Ākāśa. The word space has no such meaning. The space is taken as a void, it can not produce anything. But Ākāśa is not taken as void, unproductive. On the contrary all the sages say that Ākāśa produced Vāyu.[2] Uptil now the science does not look to space as having

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1. Taitt. Up. bhrgu. 9.
पृथिवी वा अन्नम्। आकाशोऽन्नादः। पृथिव्यामाकाशः प्रतिष्ठितः। आकाशे पृथिवी प्रतिष्ठिता।

2. Taitt. Up.
Brahmānand Vallī Anuvāk I
आकाशाद् वायुः

some energy, but I am sure, in future, science will accept that space also contains some energy, and can produce Vāyu.

"Prakāśa" is the opposite of Ākāśa. Kāś means 'to reveal' or 'manifest'. "Pra" is a prefix meaning very much. The thing which reveals itself very much is Prakāśa. Prakāśa means light. Light always reveals itself. So Prakāśa is a meaningful scientific term.

EMBRYOLOGY

Aitereya Upaniṣad belongs to Śākala branch of Rigveda and is composed by sage Mahīdāsa. It is very ancient, but its exact time cannot be fixed. Medical science and Embryology appear to be highly evolved at that time. Its Adhyāya I, Khaṇḍ I, Anuvāk 4 gives information about the development of embryo, which equals that of the ultra modern science.

At the outset Aitereya says that the life has its origin from water.[1] Modern Biology agrees with this concept. It holds that all the living things originated from ocean.

About the embryo the Upaniṣad says that first its mouth with Vāk was formed, then nostrils, then eyes, then ears, then heart, then umbilical cord, then genital organs.[2] Śrīmad Bhāgavata has elaborated on this concept. It gives the periods of these developments. According to Śrīmad Bhāgavata, Skandha 2, Adhyāya 10 as well as Skan. 3 Adhyāya

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1. Ait. up.1-1-3.
   सोऽद्भ्य एव पुरुषं समुद्धृत्यामूर्च्छयत् ।।
2. ibid. 1-1-4.
   तमभ्यतपत् । तस्याभितप्तस्य मुखं निरभिद्यत यथाण्डम् ।
   ibid. 1-1-4
   मुखाद् वाक् । वाचः अग्निः । नासिके निरभिद्येताम् । नासिकाभ्यां प्राणः ।
   प्राणाद् वायुः । अक्षिणी निरभिद्येताम् । अक्षीभ्यां चक्षुः । चक्षुष आदित्यः ।
   कर्णौ निरभिद्येताम् । कर्णाभ्यां श्रोत्रं । श्रोत्राद् दिशः ।
   त्वक् निरभिद्यत । त्वचो लोमानि लोमभ्यः ओषधिवनस्पतयः ।
   हृदयं निरभिद्यत हृदयात् मनः । मनसः चंद्रमाः ।
   नाभिः निरभिद्यत । नाभ्याः अपानः अपानात् मृत्युः ।
   शिश्नं निरभिद्यत । शिस्नात् रेतः । रेतसः आपः ।

6, 7 and 31 at the end of first month of pregnancy the head is formed. In it, first the mouth appears, then in sequence, nostrils, eyes,ears, skin, heart, umbilical cord, genital organ and anus is formed.[1] The same sequence is mentioned by modern science, which states that 32 days embryo does show head and mouth (Stomodium). In the fifth week olfactory placodes develop. At the same time inside the mouth palate, tongue, uvula and vocal cords are formed. Aitereya gives this information in saying that with Mukha, Vāk is formed.

According to the modern Embryology, 12 mm. long embryo shows, mouth and nostrils but no eyes. 14 mm. embryo shows eyes but no ears, ears develop later. Thus the order of development stated by the sage is correct according to the modern science.

Heart comes into existence in the second or third month of embryonic life according to Bhāgavata. Upto 1972, science held that foetal heart begins working in the fifth month of pregnancy. But in

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1. Bhāg. P. 3-31.
कर्मणा दैवनेत्रेण जन्तुर्देहोपपत्तये ।
स्त्रियाः प्रविष्ट उदरं पुंसो रेतःकणाश्रयः ।। 1
कललं तु एक रात्रेण पंचरात्रेण बुदबुदम् दशाहेन कर्कन्धूः पेश्यण्डं वा ततः
परम् मासेन तु शिरो द्वाभ्यां बाह्वङ्घ्र्याद्यङ्गविग्रहः । 112
नखलोमास्थिचर्माणि लिंगच्छिद्रोद् भवस्त्रिभिः ।। 3
ibid 3-26.
निरभिद्यतास्य प्रथमं मुखं वाणी ततोऽभवत् ।
वाण्या वह्निरथो नासे प्राणोतो घ्राण एतयोः।। 54
घ्राणाद्वायुरभिद्येतामक्षिणी चक्षुरेतयोः ।
तस्मात्सूर्यो व्यभिद्येतां कर्णौ श्रोत्रं ततो दिशः ।। 55
शिश्नं निर्बिभिदे ततः ।। 56
निरभिद्यत गुदम् ।। 57
हस्तौ....
पादौ....।। 58
अथास्य हृदयं भिन्नं हृदयान्मन उत्थितम् ।। 60

December 1972, Dr. Robinson of Queen Mother's Hospital, Glasgow, England confirmed with the Diasonar apparatus that foetal heart begins in the second month of pregnancy. Thus the ancient knowledge of India, 7000 years old, got confirmation in 1972 AD.

One more statement of Aitereya is shocking. It says: "From ears the directions came into existence."[1] As soon as we hear the word 'direction', we think of East-West-North-South, and then disbelieve the statement. With this disbelief the Sanskrit Pandits translated the verse as "Directions are the Deities of ears." But the sage has not said so. He does not utter the word "Deity". He states in plain words "Directions develop from ears." It is true. He says this about any living creature. For a living creature there are directions like front, back, right, left, up and down. All these directions are recognised by ears, because in the internal ear a special device termed as Vestibular apparatus or Labyrinth is situated. It is composed of three semicircular canals at right angles to each other, containing some fluid. This helps in recognizing the direction where head is titled. This Vestibular apparatus was discovered by Mc Nally in 1925. Rose and Tait published a thesis on this in 1936. Thus modern discoveries are found mentioned in ancient Indian literature.

How did the ancient sages discover the Vestibular apparatus measurable in millimetres, situated in the internal ear, in a thick bony skull ?

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1. Ait. Up. 1-1-4-
कर्णौ निरभिद्येताम् ।
कर्णाभ्यां श्रोत्रं । श्रोत्राद् दिशः ।।

How could the ancient sages find out when the heart in the chest of a living foetus, situated inside the uterus, in the abdomen of a living lady, began pulsating ? How could the sages find out the developmental stages in the skull of a living foetus ? Sonography is a boon to the modern science which can show the movements of foetal heart; did the sages possess such sonographs ? The development of vocal cords of foetus cannot be seen by sonography, then how could the sages get that knowledge ? May be they had some instruments or they may have achieved the knowledge by Yogic science.

Bhāgavata gives some more marvellous microscopic details about the origin of a person (Puruṣa) but it belongs to a later period, about 1600-2000 BC. I need not consider those advances in science here because, here, we are considering sciences in the Vedas and not Purāṇas.

Aitareya states that Apāna developed from umbilicus and death originated from Apāna. Modern science does not accept this directly, but it appears to be true. Let us see how. The umbilicus or connecting stalk is attached to abdomen of foetus. It develops in the second month of pregnancy and carries blood and oxygen to the foetus. Before this stage the embryo was a mass of cells taking their own food and oxygen independently. But when the connecting stalk is developed in the second month the foetus depends for nourishment and oxygen on the connecting stalk supplying blood from the placenta. If this connecting stalk gets blocked due to any reason, the foetus dies. Hence the sage's statement that from Umbilicus Apāna and death originate, appears to be true.

Aitareya Adhāya 2, Khand 4, Mantra 1 states "Ātman first comes in male and resides in him as the 'foetus'. It is nothing else but the Sperm. Sperms are the extract of the whole body's energy. It nourishes itself. When it is deposited in a female it develops. It is his first birth".[1]

Really all the statements are scientifically true. Life is an energy, a part and parcel of supreme energy called as Ātman. It comes in a male body first and resides as a Sperm. Sperm is actually an extract of all parts of a living animal. We can experience this at the time of coitus. When semen ejaculates, we feel something is extracted from all over our body. It is not only apparent but a true fact. The Sperm has a capacity to reproduce exactly the body from which it arises. All the chromosomes and genes are present in a Sperm, in a haploid number. The genetic matter represents the whole body. So the sage is true. It is also true that the Sperm nourishes itself from the surrounding seminal fluid. Sperm does not take oxygen, food and blood from any blood vessel. It is freely swimming. The Sperm develops further only when it is deposited in a female.

What is birth ? Science says that birth means coming to life. Suppose on 4th February 1994 at 7-28 pm. a child is born. Does this mean that the child got his life on this particular date and time ? Was there no life on 3rd Feb. 94 ? Was there no life eight months earlier ? Of course, there was life. Then we

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1. Ait. Up. 2-4-1.
पुरुषो ह वा अयं आदितो गर्भो भवति । तदेतद्रेतः ।
यदेतत्सर्वेभ्योंऽगेभ्यस्तेजः संभूतमात्मन्येवात्मान बिभर्ति ।
तद्यदा स्त्रियां सिंचत्यथैनज्जनयति । तदस्य प्रथमं जन्म ।।

must agree that the definition of birth given by modern science is wrong. The sage uses the word "Janayati", Its root is 'Jan'. A similar word in English is generate. Both the words mean one thing coming out of another. The Sperm comes out of a male, so it is generated. It is the first generation.

The sage says that it is his first "Janma". 'Janma' means a period from generation to disappearance. The Sperm generates from a male and enters a female, resides there for nine months and goes away. This phase is his first birth.

MANTRA 2

The Sperm merges with the female, thinking her to be self. That is why it does not kill her. She also accepts it as her "Self".[1]

The Sperm really merges with an ovum of the female. It does not show any difference to her. That is the reason why the Sperm does not kill her. From this statement it appears that the sage knew the foreign body reaction well. If blood enters a different body it mismatches and kills the other body. Other tissues also give foreign protein reaction killing a person. But this type of reaction never occurs with a Sperm. The female also accepts the Sperm as her "self". Her body does not show rejection syndrome as is seen in graft operations.

MANTRA 3 : states that when a child comes out of a female body it is his second birth. This needs

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1. Ait. Up.
   तत्स्त्रिया आत्मभूयं गच्छति यथा स्वमंगं तथा ।
   तस्मादेनां न हिनस्ति सास्यैतमात्मानमत्र गतं भावयति ।। 2

no comments because it really comes out for the second time.[1]

MANTRA 4 : states that the child lives till old age and passes away and takes his rebirth. This is the third birth or generation.[2]

At the time of death the real "self" goes out of the body. Coming out of the body means generation. This is the third time it comes out of the body. First it comes out of the father, then out of the mother and third time comes out of himself. Thus death means third birth. Here rebirth theory is postulated, which prevails all over the Vedic literature. Rebirth thoery is scientific but there is no socpe for a full commentary on rebirth here for want of space.

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1. ibid.
   सा भावयित्री भावयितव्या भवति तं स्त्री गर्भं बिभर्ति
   सोऽग्र एव कुमारं जन्मनोऽग्रेऽधि भावयति । स यत्कुमारं जन्मनो
   ऽग्रेऽधिभावयत्यात्मानमेव तद् भावयत्येषां लोकानां संतत्या
   एवं संतता हीमे लोकास्तदस्य द्वितीयं जन्म ।। ३

2. Ait. Up.
   सोऽस्यायमात्मा पुण्येभ्यः कर्मभ्यः प्रतिधीयते ।
   अथास्यायमितर आत्मा कृतकृत्यो वयोगतः प्रैतिः ।
   सह इतः प्रयन्नेव पुनर्जायते ।
   तदस्य तृतीयं जन्म ।। 4

CHAPTER - XXII

ĀTMAN AND BRAHMAN

"Ātman" or the real self is also dealt with in the Vedic literature. All the Upaniṣads talk about the Ātman or Parmātman but Kena Upaniṣad explains it beautifully by asking some questions and making us think on it. In the first verse of Kena Upaniṣad the sage questions: "With whose wish our mind goes about its aim ? By whose wish our Prāṇa residing in our body passes away ? Who instigates our tongue to speak ? Which god joins eyes and ears and makes them work ?"[1]

These are fundmental questions in the spritual science, but the modern physical science does not think about it, even the questions have not arisen in the minds of the scientists.

Our mind continuously goes on combining with some subject. Which energy forces it to do so ? The mind is not in our own control. We sit to think on one particular subject but unknowingly our mind goes on to other subject. We notice it after some time. When we decide to see or think of one object, our brain tries to get it done, but it is not done, because the brain has no control on the mind. Then what controls the mind ? The energy which controls the mind is Ātman.

Life remains connected with the body for some period, but then, all of a sudden, life goes away, leaving the body dead. Our brain does not wish so,

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1. Kenop. 1-1.
केनेषितं पतति प्रेषितं मनः ।
केन प्राणः प्रथमः प्रैति युक्तः ।
केनेषितां वाचमिमां वदन्ति ।
चक्षुः क्षोत्रं क उ देवो युनक्ति ।।

no organ of our body wishes so, but the life passes away. By whose order this happens ? Modern science has no answer but the sages say Ātman controls the life.

Who instigates our tongue and vocal cords to speak ? The modern scientist will say: "Brain instigates". Brain gives neuronic currents to the vocal cords no doubt, but then who orders the brain to send the neuronic currents ? Many times we sit to talk or write but we cannot produce a single word. Why ? Brain cannot send messages to the tongue because brain itself does not get a message from Ātman. On other occasions we do not wish to write, but suddenly we get marvellous thoughts and we are forced to write. These thoughts do not come from brain but from Ātman.

Who combines eyes and ears together ? The nerve supply to the eyes in quite different from that of the ears. Even then if we hear some sound, our eyes look at the direction from where the sound comes. If we look at the lecturer we understand the lecture well, but if we cannot see the lecturer, we cannot understand nicely. News on radio cannot be as easily followed as those on Television. This fact proves that eyes and ears are connected to each other as said by the sage. All other sense organs are also connected to each other. If a deer gets some smell, immediately it starts hearing for a sound and looks for some movement. At the same time its legs become allert to run. Who does it ? Brain does not do this job. Only Ātman can do it. If we get a prick or a bite or a shock to our hand, instantaneously our hand gets dragged away. We do not understand what happened. Hence our mind and brain have not worked it out. The medical science tells that it is a reflex action done by the spinal cord. Then the question comes who prepared this mechanism ?

Finally the only answer remains that some supreme energy has done all this. It is called Ātman or according to Praśna Upaniṣad 4-9, it is 'Puruṣa'.

Ātman cannot be seen or described or felt or heard. Even mind and intelligence cannot grasp it. We can not think of it, but due to it we can think. We cannot see it, but due to its presence our eyes can see. Five sense organs cannot grasp it but those sense organs work with its energy. Ātman does not live due to Prāṇa, on the contrary Prāṇa exists due to that Brahma. "It is as small as an atom of an atom and resides in a secret place in our body" says Kaṭha Upaniṣad 1-2-8 and 12.

Let us here try to calculate its size as told by Kaṭha. It is Anu's Anu, or atom of an atom. This can be written as a ratio.

$$\frac{\text{Man}}{\text{Atom}} = \frac{\text{Atom}}{\text{Ātman}}$$

$$\therefore \frac{160 \text{ cm}}{10^{-8}} = \frac{10^{-8}}{\text{Ātman}}$$

Where man's height is taken as 160 cm while atom is 10^{-8} cm.

$$\therefore \text{Ātman} = \frac{10^{-8} \times 10^{-8}}{160} = \frac{10^{-16}}{160} = \frac{10^{-18}}{1.6}$$

$$= \frac{1}{1.6 \times 10^{18}} \text{ cm}$$

This means Ātman is equal to 1 divided by 1.6 Parārdha centimetres. Parārdha is a number written as 18 zeros on one. (10^{18}) Even Yajurved (17-2) has quoted numbers upto Parārdha 10^{18}.

Modern science says that the diameter of atom is 1.5×10^{-8} cm. The nucleus of an atom is 5×10^{-13} cm and diameter of Proton is 2×10^{-13} cm. Thus it

seems that the modern science has gone upto 10^{-13} cm but ancient sages had gone upto 10^{-18} cm. So in terms of mathematics we can say that the flight of wisdom of sages is 10^5 = 100000 that is one lac times greater than that of the modern scientists.

Ātman is so small, therefore, it is imperceptible. For the same reason it can occupy the minutest place in our body. Such a place is in the nucleus of all the Living cells or rather it is present inside the subatomic particles of Deoxy-Ribo-Nucleic Acid or the matter of which a cell is formed.

Katha 1-2-20 states that Ātman is smallest of the small and biggest of the big. Modern science cannot measure how big it is. It says that the limit of the Universe may be 13000 millions light years because science has recorded stars 1000 million light years distant with the help of a Telescope having 200 inches diameter. Sages mention that millions of Universes are situated in the Brahman

The word 'Brahman' means one which is spreading or which has vast expanse. The word 'Ātman' means I, me, self. From this I think that the thing which contains sense of self is Ātman. Each creature has got sense of self, that means Ātman is present in each living creature. All these units of self together are infinite and are called Paramātman. Around us are five Mahā Bhūtas: Ākāśa, Vāyu, Tejas, Āpaḥ and Pṛthvī. These do not have ego and they have a vast expanse. Therefore they are together called as Brahman. This vast Brahman and Paramātman together are called as Parabrahman. So mathematically we can write this as:

Parabrahman = Brahman + Paramātman

= Brahman + Ātman + Ātman ----upto infinity.

First there was only one Parabrahman. It

thought of producing something and produced Ākāśa. It occpied Ākāśa itself. Then in that order all the Mahā Bhūtas were prepared. Then, from the waters it manufactured living organisms (Aitereya).[1] This is accepted by Biology which states that all the life began in the ocean. These living creatures are the combination of five Mahā Bhūtas and Ātman. Ātman is a fraction of Paramātman, just like a spark of a great fire (Muṇḍak 2-1-1).

Ātman produces Jīva. From Jīva originates Manas, from Manas five sense organs and five creative organs. All these together form a living animal.

Ātman actually is an all pervading energy (Kaṭha 2-2-9 to 13). But for the sake of talking we call it as "My Ātmā". I say "this is my water in my glass." But is it true that the water in mine ? That water is present in the whole of the city. There is no differentiation between my water and city water. Similarly Ātman can't be differentiated. The differentiation occurs in the outer coats namely Ānandmaya, Vijñānamaya, Manomaya, Prāṇamaya and Annamaya. Actually all these coats, even the Annamaya is also all pervading. It is formed of five Mahā Bhūtas, which are present everywhere in the Universe. So differentiation is in the unique combination of Ātman and five coats and five Mahā Bhūtas. Thus it all appears as illusion and hence is is termed as 'Māyā'.

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1. Ait. Up. 1-1-3.
   सोऽद्भ्य एव पुरुषं समुद्धृत्यामूर्च्छयत् ।।

CHAPTER - XXIII

MĀYĀ

Why is everything called as Māyā, illusion ? Let us take an example. We say our mind goes to a subject. Kena Upaniṣad 24 states, "There is all pervading Ātman therefore this mind as if goes."[1] Why should the sage say "as if goes"? Because he knew that the mind does not leave its place but still it appears to go. Is it possible ? Yes, it is possible. To prove this I will suggest one experiment. Fix one end of a rope to some pole. Take its other end in the hand and move the hand up and down. With this movement you will see that waves of rope are going from your hand to the pole. Does the rope really go ? No, not at all. It is fixed at both ends then how can it go ? It is an illusion but we see it "as if it goes".

The same thing happens in case of water. When we see waves in water we feel that one wave came here and and other went there. But actually the wave does not go anywhere only the particles of water move up and down so we feel that wave is going. Same is the case with our mind. Mind is nothing else but waves in some medium. Probably this medium is electromagnetic waves because Electro-encephalograph can record these waves. But electromagnetic waves are only one tongue of that

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1. Kenop. 4-5.
   अथाध्यात्मम् । यदेतद् गच्छतीव च मनः ।
   अनेन चैतदुपस्मरत्यभीक्ष्णं संकल्पः ।। 24

Ātman as told by Muṇḍaka (1-2-4).[1] So it is certain that Ātman is the medium due to which mind appears to go to its subject. Like mind other coats – Ānandamaya, Vijñānamaya, Prāṇamaya and Annamaya are also mere waves in the Ātman.

In the sea we see many waves, one big, other small, still another enormous. All sorts of shapes and sizes are there in the waves but they are made up of only one water. Similarly everything, small or enormous, in this Universe is made up of only Ātman. Ātman forms Proton, Neutron, Electron and other particles. Their combinations and permutations prepare all the things in the world. Only one principle takes up so many forms, therefore all is Māyā, illusion. Only Ātman is Real. That is why Ādi Śaṅkarācārya says "Brahma Satyam, Jagan Mithyā."

Scientifically it is true that each and every thing in this world is formed of only three subatomic particles – Protron, Neutron and Electron. There is no difference between a Proton of gold and that of iron. So we can say that the three subtomic particles are Satya, while all other things formed of them are Mithyā.

'Mithyā' is usually taken as false, but it is not so. The word contains a root 'Mith' which means "to join". A thing which is formed of combination of two or more things is 'Mithyā'. Thus it is 'Satya' (true) that everything in the world is 'Mithyā.

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1. Mundak. 1-2-4
काली कराली च मनोजवा च
सुलोहिता या च सुधूम्रवर्णा ।
स्फुल्लिंगिनी विश्वरुची च देवी
लेलायमाना इति सप्त जिव्हाः ।। 4

All the things in this world – living and nonliving – are termed as Prajā. Prajāpati is the originator of all these things. According to Praśna Upaniṣad 1-4, Parjāpati gave rise to a couple – Rayi and Prāṇa and hoped that the couple will produce many things.[1] This couple Rayi and Prāṇa is nothing else but the matter and energy, of the modern science from which all the things are produced. In Praśna 1-5, the sage defines Rayi as any form – Mūrtireva Rayi.[2] Thus it is cerain that Rayi meas matter. Prāṇa is a word composed from root 'An' meaning to move. So Prāṇa is energy.

This concept of high philosophy of science went from India to Europe, but there it got malformed. The people there in Europe took the couple as a human couple - Adam and Eve and wrote a story which is famous in Bible. It is a distortion from Upaniṣad.

The basic concept that everything in this world originated from only one principle is stated in Kaṭha 2-3-1 in the form of a metaphor that there is an eternal tree having its root up and branches downwards. The tree is Brahman.[3] There is a deep thought behind this metaphor, let us examine it.

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1. Praśnop.1-4.
   तस्मै स होवाच प्रजाकामो वै प्रजापतिः स तपोऽतप्यत स तपस्तप्त्वा स मिथुनमुत्पादयते रयिं च प्राण चेत्येतौ मे बहुधा प्रजाः करिष्येत इति ।। 4
2. ibid 1-5.
   आदित्यो ह वै प्राणो रयिरेव चन्द्रमा रयिर्वा
   एतत्सर्वं यन्मूर्तं चामूर्तं च तस्मान्मूर्तिरेव रयिः ।। 5
3. Kathop.2-3-1.
   ऊर्ध्वमूलोऽवाक् शाख एषोऽश्वत्थः । सनातनः ।
   तदेव शुक्रं तद् ब्रह्म तदेवामृतमुच्यते ।
   तस्मिन्लोकाः श्रिताः सर्वे तदु नात्येति कश्चन । एतद्वै तत् ।।

A man is like such a tree. He is full of energy but the source of energy is in the brain. Brain is thus a root from which a trunk originates and runs downwards as a Spinal Cord. From this trunk all the branches of nerves spread all over, down the body upto the toes. Same thing is applicable to all the animals. Thus every animal is an upside down tree.

Where is the source of energy to all the brains of all the animals ? Modern science knows that all the creatures of this world get energy from the Sun. So the root is the Sun and it is up in the sky. From that root all the branches or currents of energy spread down over the Earth.

From where does the Sun get energy ? There are many Suns - the stars in our Galaxy. They may be taking energy from the centre of the galaxy, which is situated higher up in the sky. All these galaxies may have a source of energy - a root, some where above them all. Thus we reach upto the Parabrahman as the prime root.

Even if we consider our genealogy we will see a tree with roots up and branches down. If one person is taken as a root his sons and daughters will be branches spreading downwards. Grand sons will be still lower branches, and so on, the branches will go on spreading down up to infinity. If this original person is considered we will find that he himself is one branch and his brothers and sisters will be other branches, while his father will be root. But that father himself will be a branch. Thus if we go up tracing the root we will reach a first human being on this earth. From that single root all the branches have spread downwards to produce 500 crores of human beings on this earth at present. But

that first human being will be found to be a branch – his brother branches being apes and mokeys. In this way if we go upwards tracing the root we will reach the first animate thing of this earth. But then it will be a branch having brother branches of all inanimate things. Thus if traced upwards we will reach the prime root "Brahman" from where the whole tree of the Universe has spread downwards. Hence Kaṭha 2-3-2 says that all this world has its origin in Prāṇa.[1] Thus from this Prāṇa the subatomic particles have originated and from them all the world is born.

The energy in the world is one and unique according to Vedas but the modern science felt that there are many energies like mechanical, thermal,chemical, electrical and so on. Later on science discovered that all the energies are facets of only four basic energies – Gravitional, Electromagnetic, weak nuclear and strong nuclear. Still later in the last decade science came to the conclusion that these four basic energies are parts of only one energy. Thus the recent-most science coroborated the ancient-most Vedic view.

The material from which Proton, Neutron, Electron are made is still unknown to the modern science but our ancient literature is sure that they are formed of Ātma Tatva which is indescribable, unmanifested, eternal, imperishable, having no form at all. It resides inside and outside everything. (Isha 5).[2]

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1. Kath. 2-3-2.
   यदिदं किं च जगत्सर्वं प्राणे एजति निःसृतम् ।
2. Īśa. Up.5.
   तदेजति तन्नैजति तद्दूरे तदु अंतिके ।
   तदंतरस्य सर्वस्य तदु सर्वस्यास्य बाह्यतः ।। 5

If a person knows that the matter from which he is built is present in other animals and other human beings, he will not hate anybody and there will be equality all over the world.[1]. And it will give rise to peace in mankind.

Here I have commented on only a few drops of the ocean of Vedic knowledge. It proves that the Vedic people were scientifically well advanced. They have recorded all their knowledge in the four Vedas and Vedāṅgas. Let us co-operate with each-other to take out more scientific gems from the vast ocean of Vedic literature compiled by the Seers. It will help us rise in the material world by advancing the science and will give us equality and peace by its philosophical knowledge.

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1. Īśa. Up.6.
यस्तु सर्वाणि भूतानि आत्मन्येवानुपश्यति सर्व भूतेषु चात्मानं ततो न विजुगुप्सते ।। 6